Soil Survey Investigations Report No. 10

Soil Survey Laboratory Data and Descriptions for Some Soils of...

Soil Survey Investigations Report No. 10

Soil Survey Laboratory Data and Descriptions for Some Soils of...

...COLORADO

August 1967

SOIL CONSERVATION SERVICE U.S. DEPARTMENT OF AGRICULTURE
In cooperation with
COLORADO AGRICULTURAL EXPERIMENT STATION

1. SAMPLE COLLECTION AND PREPARATION
   A. Field sampling
      1. Site selection
      2. Soil sampling
         a. Stony soils
   B. Laboratory preparation
      1. Standard (airdry)
         a. Square-hole 2-mm sieve
         b. Round-hole 2-mm sieve
      2. Field moist
      3. Carbonate-containing material
      4. Carbonate-indurated material
2. CONVENTIONS
   A. Size-fraction base for reporting
      1. <2-mm
      2. <size specified
   B. Data-sheet symbols
      tr: trace, not measurable by quantitative procedure used or less than reportable amount
      tr(s): trace, detectable only by qualitative procedure more sensitive than quantitative procedure used
      : analysis run but none detected

5A. Cation-exchange capacity (cont.)
      2. NaOAc, pH 8.2
         a. Centrifuge method
      3. Sum of cations
         a. Acidity by $BaCl_2$-TEA, pH 8.2; bases by NH_4OAc, pH 7.0
      4. KOAc, pH 7.0
      5. $BaCl_2$, pH 8.2
         a. Barium by flame photometry
   B. Extractable bases
      1. NH_4OAc extraction
         a. Uncorrected
         b. Corrected (exchangeable)
      2. KCl-TEA extraction, pH 8.2
   C. Base saturation
      1. NH_4OAc, pH 7.0
      2. NaOAc, pH 8.2
      3. Sum of cations
   D. Sodium saturation (exchangeable Na pct.)
      1. NaOAc, pH 8.2
      2. NH_4OAc, pH 7.0
   E. Sodium-adsorption ratio
6. CHEMICAL ANALYSES
   A. Organic carbon
      1. Acid-dichromate digestion
         a. $FeSO_4$ titration

6. CHEMICAL ANALYSES (cont.)
   J. Bicarbonate
      1. Saturation extract
         a. Acid titration
   K. Chloride
      1. Saturation extract
         a. Mohr titration
         b. Potentiometric titration
   L. Sulfate
      1. Saturation extract
         a. Gravimetric, $BaSO_4$
      2. NH_4OAc extraction
         a. Gravimetric, $BaSO_4$
   M. Nitrate
      1. Saturation extract
         a. PDS acid colorimetry
   N. Calcium
      1. Saturation extract
         a. EDTA titration
      2. NH_4OAc extraction
         a. EDTA-alcohol separation
         b. Oxalate-permanganate I
         c. Oxalate-permanganate II Fe, Al, and Mn removed
         d. Oxalate-cerate
      3. NH_4Cl-EtOH extraction
         a. EDTA titration

PREFACE

This publication is one in a new U.S. Department of Agriculture series established to preserve and make available technical information resulting from soil survey investigations. These investigations have been going on for about two decades. Data from them have been distributed in unpublished form to those immediately concerned. Some of the data and descriptions have appeared in technical journals, in regional bulletins, in USDA technical bulletins, and in the text of published soil surveys. But most were not available to all who might use them.

We intend to publish in this series all data from the soil survey laboratories that form reasonably complete characterizations of soils. Already-assembled data and descriptions will be published just as rapidly as they can be prepared for printing. Fragmentary data collected as reference points for specific soil surveys will not be included.

While these data were being assembled, there were many changes in laboratory methods. Some were improved and some new ones were devised. Consequently, laboratory data for different soils cannot always be directly compared without allowance for the method.

The method used is indicated by symbol in the column headings of the data table. These symbols are identified in the code sheet on the opposite page. Each method is described in the first number of this series, "Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples," SSIR No. 1.

Ways of describing soils have also changed. Soil descriptions have become explicit on more and more features. The systems for designating horizons and for classifying soils have been changed.

The soil descriptions published here were prepared as working documents to meet a specific need of a soil survey at the time the soil samples were collected. The soil scientists who wrote them had no idea they would be published. Editing has been limited for the most part to that necessary for conformance to the "Soil Survey Manual." Field textural estimates have been retained, even though some are at variance with the laboratory data, because the field estimates themselves are important data.

There were several reasons for sampling these soils. Some were sampled to study soil genesis, some to facilitate classification, and some to obtain data to permit more useful interpretations. Those sampled for genesis or classification studies do not always fit neatly into our present concepts of soil series. Partly because of these studies, our concepts of some soil series have been modified. As a consequence, the soil series name assigned a soil at the time of sampling is not always the name that would be assigned today. Soil series names in this publication follow 1965 series definitions.

Soil Survey
Soil Conservation Service

Soil Series	County	Soil Survey No.	Page
Ascalon	Morgan	S59Colo-44-1	3
	Morgan	S59Colo-44-2	5
Baca	Baca	S55Colo-5-3	7
	Baca	S55Colo-5-4	9
	Prowers	S58Colo-50-1	11
	Prowers	S58Colo-50-10	13
*Bancroft	Douglas	S63Colo-18-7	15
	Douglas	S63Colo-18-8	17
Bassel	Chaffee	S58Colo-8-3	19
	Chaffee	S58Colo-8-12	21
*Bijou	Morgan	S59Colo-44-3	23
	Morgan	S59Colo-44-4	25
Bobtail	Grand		27
	Grand		29
	Grand		31
	Grand		33
	Grand		35
	Grand		37
Bottle	Grand		39
	Grand		41
	Grand		43
	Grand	S55Colo-25-2	45
Bresser	Arapahoe	S61Colo-3-9	47
	Arapahoe	S61Colo-3-10	49
Buena Vista	Chaffee	S58Colo-8-7	51
	Chaffee	S58Colo-8-10	53
*Buick	Arapahoe	S61Colo-3-5	55
	Arapahoe	S62Colo-3-6	57
	Arapahoe	S61Colo-3-8	59
*Cabin	Gunnison	S59Colo-26-4	61
	Gunnison	S59Colo-26-5	63
Campo	Baca	S55Colo-5-1	65
	Baca	S55Colo-5-2	67
Chubbs	Chaffee	S58Colo-8-6	69
	Chaffee	S58Colo-8-8	71
Colby	Prowers	S58Colo-50-2	73
	Prowers	S58Colo-50-3	75
	Prowers	S60Colo-50-1	77
	Prowers	S60Colo-50-2	79
	Prowers	S60Colo-50-5	81
	Prowers	S60Colo-50-6	83
Darling	Grand		85
	Grand		87
	Grand		89
	Grand		91
*Deertrail	Arapahoe	S61Colo-3-4	93
	Arapahoe	S61Colo-3-6	95
Edloe	Chaffee	S57Colo-8-1	97
	Chaffee	S57Colo-8-2	99
	Chaffee	S57Colo-8-3	101
*Fondis	Douglas	S63Colo-18-3	103
	Douglas	S63Colo-18-4	105
Haxtun	Sedgwick	S63Colo-58-3	107
	Sedgwick	S63Colo-58-5	109
	Sedgwick	S63Colo-58-6	111
Heath	Chaffee	S58Colo-8-2	113
	Chaffee	S58Colo-8-4	115
*Julesburg	Sedgwick	S63Colo-58-2	117
	Sedgwick	S63Colo-58-4	119
Keith	Sedgwick	S63Colo-58-11	121
*Kettle	Douglas	S63Colo-18-1	123
	Douglas	S63Colo-18-2	125
	Douglas	S63Colo-18-9	127
Kuma	Sedgwick	S63Colo-58-7	129
	Sedgwick	S63Colo-58-10	131
Laporte	Chaffee	S58Colo-8-9	133
Leal	Grand	S55Colo-25-3	135
	Grand	S55Colo-25-4	137
Litle	Arapahoe	S61Colo-3-1	139
	Arapahoe	S61Colo-3-2	141
*Lucky	Gunnison	S59Colo-26-2	143
Mine	Grand	S55Colo-25-7	145
	Grand	S55Colo-25-8	147
Nathrop	Chaffee	S58Colo-8-5	149
Nepesta	Prowers	S60Colo-50-9	151
	Prowers	S60Colo-50-10	153
Nystrom	Clear Creek	S55Colo-10-1	155
*Parlin	Gunnison	S59Colo-26-1	157
*Penitente	Boulder	S57Colo-7-1	159
	Boulder	S57Colo-7-2	161
*Peyton	Douglas	S63Colo-18-5	163
	Douglas	S63Colo-18-6	165
Platner	Morgan	S59Colo-44-9	167
	Morgan	S59Colo-44-10	169
Ptarmigan	Boulder	S57Colo-7-3	171
	Boulder	S57Colo-7-4	173
	Boulder	S57Colo-7-5	175
	Boulder	S57Colo-7-6	177
	Grand		179
	Grand	S55Colo-25-1	181
Rago	Kit Carson	S54Colo-32-3	183
	Kit Carson	S54Colo-32-4	185
Richfield	Sedgwick	S63Colo-58-8	187
	Sedgwick	S63Colo-58-9	189
	Prowers	S58Colo-50-6	191
	Prowers	S58Colo-50-7	193
Rocky Ford	Prowers	S60Colo-50-3	195
	Prowers	S60Colo-50-4	197
	Prowers	S60Colo-50-7	199
	Prowers	S60Colo-50-8	201
Stecum	Chaffee	S57Colo-8-4	203
	Chaffee	S57Colo-8-5	205
	Chaffee	S57Colo-8-6	207
Tabernash	Grand	S55Colo-25-5	209
	Grand	S55Colo-25-6	211
*Tex	Gunnison	S59Colo-26-3	213
	Gunnison	S59Colo-26-6	215
Trout Creek	Chaffee	S58Colo-8-1	217
	Chaffee	S58Colo-8-11	219
Truckton	Elbert	S61Colo-20-1	221
	Morgan	S59Colo-44-7	223
	Morgan	S59Colo-44-8	225
Vasquez	Clear Creek	S55Colo-10-2	227
	Grand		229
Vona	Bent	S61Colo-6-1	231
	Morgan	S61Colo-44-1	233
Weld	Arapahoe	S61Colo-3-3	235
	Arapahoe	S61Colo-3-7	237
	Kit Carson	S54Colo-32-1	239
	Kit Carson	S54Colo-32-2	241
*Weldona	Morgan	S59Colo-44-5	243
	Morgan	S59Colo-44-6	245
Wiley	Prowers	S58Colo-50-8	247
	Prowers	S58Colo-50-9	249

*Soil series names preceded by an asterisk are names of tentative series.

County	Soil Series	Soil Survey No.	Page
Arapahoe	Bresser	S61Colo-3-9	47
	Bresser	S61Colo-3-10	49
	*Buick	S61Colo-3-5	55
	*Buick	S62Colo-3-6	57
	*Buick	S61Colo-3-8	59
	*Deertrail	S61Colo-3-4	93
	*Deertrail	S61Colo-3-6	95
	Litle	S61Colo-3-1	139
	Litle	S61Colo-3-2	141
	Weld	S61Colo-3-3	235
	Weld	S61Colo-3-7	237
Baca	Baca	S55Colo-5-3	7
	Baca	S55Colo-5-4	9
	Campo	S55Colo-5-1	65
	Campo	S55Colo-5-2	67
Bent	Vona	S61Colo-6-1	231
Boulder	*Penitente	S57Colo-7-1	159
	*Penitente	S57Colo-7-2	161
	Ptarmigan	S57Colo-7-3	171
	Ptarmigan	S57Colo-7-4	173
	Ptarmigan	S57Colo-7-5	175
	Ptarmigan	S57Colo-7-6	177
Chaffee	Bassel	S58Colo-8-3	19
	Bassel	S58Colo-8-12	21
	Buena Vista	S58Colo-8-7	51
	Buena Vista	S58Colo-8-10	53
	Chubbs	S58Colo-8-6	69
	Chubbs	S58Colo-8-8	71
	Edloe	S57Colo-8-1	97
	Edloe	S57Colo-8-2	99
	Edloe	S57Colo-8-3	101
	Heath	S58Colo-8-2	113
	Heath	S58Colo-8-4	115
	Laporte	S58Colo-8-9	133
	Nathrop	S58Colo-8-5	149
	Stecum	S57Colo-8-4	203
	Stecum	S57Colo-8-5	205
	Stecum	S57Colo-8-6	207
	Trout Creek	S58Colo-8-1	217
	Trout Creek	S58Colo-8-11	219
Clear Creek	Nystrom	S55Colo-10-1	155
	Vasquez	S55Colo-10-2	227
Douglas	*Bancroft	S63Colo-18-7	15
	*Bancroft	S63Colo-18-8	17
	*Fondis	S63Colo-18-3	103
	*Fondis	S63Colo-18-4	105
	*Kettle	S63Colo-18-1	123
	*Kettle	S63Colo-18-2	125
	*Kettle	S63Colo-18-9	127
	*Peyton	S63Colo-18-5	163
	*Peyton	S63Colo-18-6	165
Elbert	Truckton	S61Colo-20-1	221
Grand	Bobtail		27
	Bobtail		29
	Bobtail		31
	Bobtail		33
	Bobtail		35
	Bobtail		37
	Bottle		39
	Bottle		41
	Bottle		43
	Bottle	S55Colo-25-2	45
	Darling		85
Grand	Darling		87
	Darling		89
	Darling		91
	Leal	S55Colo-25-3	135
	Leal	S55Colo-25-4	137
	Mine	S55Colo-25-7	145
	Mine	S55Colo-25-8	147
	Ptarmigan		179
	Ptarmigan	S55Colo-25-1	181
	Tabernash	S55Colo-25-5	209
	Tabernash	S55Colo-25-6	211
	Vasquez		229
Gunnison	*Cabin	S59Colo-26-4	61
	*Cabin	S59Colo-26-5	63
	*Lucky	S59Colo-26-2	143
	*Parlin	S59Colo-26-1	157
	*Tex	S59Colo-26-3	213
	*Tex	S59Colo-26-6	215
Kit Carson	Rago	S54Colo-32-3	183
	Rago	S54Colo-32-4	185
	Weld	S54Colo-32-1	239
	Weld	S54Colo-32-2	241
Morgan	Ascalon	S59Colo-44-1	3
	Ascalon	S59Colo-44-2	5
	*Bijou	S59Colo-44-3	23
	*Bijou	S59Colo-44-4	25
	Platner	S59Colo-44-9	167
	Platner	S59Colo-44-10	169
	Truckton	S59Colo-44-7	223
	Truckton	S59Colo-44-8	225
	Vona	S61Colo-44-1	233
	*Weldona	S59Colo-44-5	243
	*Weldona	S59Colo-44-6	245
Prowers	Baca	S58Colo-50-1	11
	Baca	S58Colo-50-10	13
	Colby	S58Colo-50-2	73
	Colby	S58Colo-50-3	75
	Colby	S60Colo-50-1	77
	Colby	S60Colo-50-2	79
	Colby	S60Colo-50-5	81
	Colby	S60Colo-50-6	83
	Nepesta	S60Colo-50-9	151
	Nepesta	S60Colo-50-10	153
	Richfield	S58Colo-50-6	191
	Richfield	S58Colo-50-7	193
	Rocky Ford	S60Colo-50-3	195
	Rocky Ford	S60Colo-50-4	197
	Rocky Ford	S60Colo-50-7	199
	Rocky Ford	S60Colo-50-8	201
	Wiley	S58Colo-50-8	247
	Wiley	S58Colo-50-9	249
Sedgwick	Haxtun	S63Colo-58-3	107
	Haxtun	S63Colo-58-5	109
	Haxtun	S63Colo-58-6	111
	*Julesburg	S63Colo-58-2	117
	*Julesburg	S63Colo-58-4	119
	Keith	S63Colo-58-11	121
	Kuma	S63Colo-58-7	129
	Kuma	S63Colo-58-10	131
	Richfield	S63Colo-58-8	187
	Richfield	S63Colo-58-9	189

SOIL SURVEY LABORATORY Lincoln, Nebr. January 1960

SOIL TYPE Ascalon fine sandy loam LOCATION Morgan County, Colorado

SOIL NOS. S59Colo-44-1 LAB. NOS. 10825-10833

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)							3A1		2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-4	A1	2.8	10.0	10.9	21.9	24.4	20.1	9.9	51.0	6.1	Tr.	fsl
4-7	A3	2.3	9.2	11.6	24.3	23.1	16.8	12.7	47.7	5.8	Tr.	fsl
7-11	[illegible]	1.5	8.0	10.3	22.7	22.7	16.4	17.4	47.9	5.2	Tr.	fsl

Soil Type: Ascalon fine sandy loam
Soil Nos.: 859Colo-44-1
Field classification: Chestnut-Brown Intergrade.
Location: 975 feet west, 825 feet south of north quarter corner, Sec. 1, T6N, R58W, Morgan County, Colorado. Photo: YE-1F-39.
Climate: Continental, average annual precipitation 13-15 inches. Elevation 4,700 feet. Frost-free season 146 days. Mean annual temperature 48° F.
Vegetation: Blue grama, pricklypear cacti, western wheatgrass, few annual weeds.
Parent material: Tertiary outwash.
Physiographic position: Upland.
Relief: Gently sloping 3 percent slope.
Aspect: Southeast-facing.
Drainage: External drainage medium, internal drainage medium.
Moisture: Moist to 30 inches at time of sampling, near saturation at surface.
Water table: None encountered.
Stoniness: Few small outwash gravels All through Cca.
Salt or alkali: None observed other than calcium carbonate.
Erosion: Slight wind and water.
Described by: Clayton F. Spears, May 4, 1959.
Remarks: Site sampled located about 300 feet below crest of short southeast-facing, 3 percent slope. Many krotovinas of insects and worms AB through Cca horizons.

Horizon and Lincoln Lab. No.

A1 10825 — 0 to 4 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist and crushed) fine sandy loam; weak fine granular structure; soft when dry, very friable when moist; noncalcareous; lower boundary clear and smooth.

AB 10826 — 4 to 7 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2.5 moist and crushed) sandy loam; weak medium prismatic structure breaking to weak medium subangular blocks; slightly hard when dry, friable moist; noncalcareous; lower boundary clear and smooth.

B21t — 7 to 11 inches. Brown (10YR 5/3 dry) to dark brown (10YR 3.5/3 moist and crushed) light sandy clay

[redacted]

slightly hard to hard dry, friable moist; very thin patchy clay skins on both horizontal and vertical faces of soil aggregates; noncalcareous; lower boundary clear and smooth.

B22t 10828 — 11 to 16 inches. Brown (10YR 4.5/3 dry) to very dark grayish brown (10YR 3/2.5 moist) dark grayish brown (10YR 4/2 crushed) sandy clay loam; moderate medium prismatic structure breaking to moderate medium subangular blocks; a few fine subangular blocks; hard when dry, friable moist; thin continuous clay skins on both horizontal and vertical faces of soil aggregates; noncalcareous; lower boundary clear and smooth.

B3 10829 — 16 to 19 inches. Pale brown (10YR 5.5/3 dry) to brown (10YR 4/3 moist) sandy clay loam; weak medium prismatic structure breaking to weak medium subangular blocks; slightly hard dry, friable moist; very thin patchy clay skins on vertical faces and in root channels; very slightly calcareous; lower boundary clear and wavy.

B3ca 10830 — 19 to 23 inches. Very pale brown (10YR 7.5/3 dry) to brown (10YR 5/3 moist) (1.25Y 5/3 crushed) sandy loam, very weak coarse subangular blocky structure; slightly hard when dry, friable moist, strongly calcareous; visible lime in seams and streaks and in small soft concretions; moderate horizon of accumulation of calcium carbonate; lower boundary clear and wavy.

Cca1 10831 — 23 to 30 inches. Very pale brown to nearly white (10YR 8/3 to 8/2 dry) to pale brown (10YR 6/3 moist and crushed) sandy loam; massive, very hard to extremely hard when dry, firm moist; very strongly calcareous; moderate to prominent horizon of accumulated calcium carbonate; lower boundary clear and wavy.

Cca2 10832 — 30 to 36 inches. Very pale brown (10YR 8/3 dry, 10YR 7/3 moist) light sandy loam; massive; dry hard, moist friable; very strongly calcareous, few medium soft lime concretions; lower boundary clear and wavy.

SOIL SURVEY LABORATORY Lincoln, Nebr. January 1960

SOIL TYPE Ascalon fine sandy loam LOCATION Morgan County, Colorado

SOIL NOS. S59Colo-44-2 LAB. NOS. 10834-10840

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent)							3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			

Soil Type: Ascalon fine sandy loam
Soil Nos.: S59Colo-44-2
Field classification: Chestnut-Brown Intergrade.
Location: 240 feet south, 1,560 feet west, northeast corner, Sec. 14, T6N, R58W, Morgan County, Colorado.
Photo: YE-1F-50.
Climate: Continental, average annual precipitation 13-15 inches, elevation 4,750 feet. Frost-free season 146 days. Mean annual temperature 48° F.
Vegetation: Grama, western wheatgrass, annual weeds.
Parent material: Tertiary outwash.
Physiographic position: Upland.
Relief: Gently sloping 3 percent slope.
Drainage: External drainage medium, internal drainage medium.
Moisture: Moist to 40 inches at time of sampling.
Water table: None encountered.
Stoniness: Few small outwash gravels All through Cca.
Salt or alkali: None observed other than calcium carbonate.
Erosion: Slight.
Described by: Clayton F. Spears, May 4, 1959.
Remarks: Numerous small krotovinas in the B2 and B3ca horizons. Sample site located on the lower part of a long 1,000 foot to 1,200 foot northwest-facing slope.

Horizon and Lincoln Lab. No.	
A11 10834	0 to 4 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist and crushed) fine sandy loam; weak coarse crumb structure breaking to weak medium crumbs; soft when dry, very friable moist; noncalcareous; clear smooth boundary.
AB 10835	4to 8 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2.5 moist and crushed) sandy loam; weak medium prismatic structure breaking to weak medium subangular blocks; noncalcareous; lower boundary clear and smooth.
B2t 10836	8 to 15 inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3.5/3 moist) or dark grayish brown (10YR 4/2 crushed) sandy clay loam; moderate medium prismatic structure breaking to moderate medium subangular blocks; hard when dry, firm moist; moderate continuous clay skins on both horizontal and vertical faces of soil aggregates; noncalcareous; lower boundary clear and smooth.
B3ca 10837	15 to 21 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist and crushed) sandy day loam; weak coarse prismatic structure breaking to weak medium and coarse subangular blocks; slightly hard dry, friable moist; very thin patchy clay skins on vertical faces of soil aggregates; strongly calcareous, visible lime in seams and streaks; lower boundary clear and smooth.
Cca 10838	21 to 28 inches. Pale brown (10YR 6.5/3 dry) to yellowish-brown (10YR 5/4 moist) or light olive brown (1.25Y 5/3 moist and crushed) light sandy clay loam; very weak coarse prismatic structure breaking to weak coarse subangular blocks; very strongly calcareous; moderate horizon of lime accumulation with visible calcium carbonate in streaks and in soft concretions. Lower boundary gradual and smooth.
C1 10839	28 to 38 inches. Light yellowish brown (1.25Y 6.5/3 dry) to yellowish brown (1.25Y 5/3 moist and crushed) sandy loam; massive; strongly calcareous, visible calcium carbonate in thin seams and streaks; lower boundary clear and smooth.
C2 10840	38 to 45 inches. Light yellowish brown (1.25Y 6.5/3 dry) to light olive brown (1.25Y 5/4 moist) sandy clay loam; massive; slightly hard dry; very strongly calcareous; visible calcium carbonate in thin seams and streaks. Lower boundary clear and smooth.
C3	45 to 60 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4.5/3 moist) yellowish brown (1.25Y 5/3 crushed) sandy loam; massive; slightly hard dry; strongly calcareous, few thin seams visible calcium carbonate. Lower boundary gradual and smooth.
C4	60 to 94 inches. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) loamy sand; massive; slightly hard dry; strongly calcareous, few thin seams visible calcium carbonate; some stratification with sandy loam material. Lower boundary abrupt and smooth.
	94 inches plus. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) shale; distinct mottles of bright yellowish brown (10YR 5/6 5/8).

Bureau of Public Roads Samples:

A11	0-4 inches
B2t	8-15 inches
C1	28-38 inches

SOIL SURVEY LABORATORY Lincoln, Nebr. 12/21/56

SOIL TYPE Baca clay loam LOCATION Baca Co., Colorado

SOIL NOS. S-55-Colo-5-3 LAB. NOS. 3527-3534

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent)								3A1		TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			2A2 > 2	

Soil Type: Baca clay loam
Location: 230 feet east of the northwest corner of Sec. 5, T32S; R48W; Baca County, Colorado.
Date of Sampling: October 4, 1955
Collector: A. J. Cline **Described by: A. J. Cline**
Physiographic Position: Upland
Topography: Gentle convex slope of approximately 3 percent facing south.
Drainage: Well drained
Vegetation: Blue grama, Buffalo grass and Russian thistle

Use: Pasture
Soil Nos.: S55Colo-5-3 **Lincoln Laboratory Nos.:** 3527-3534

0-5 **inches**
A_1
LSL 3527

Grayish brown (10YR 5/2.5 dry) to very dark grayish brown (10YR 3.5/2.5 moist) light silty clay loam; soft when dry, very friable when moist; moderate, fine granular structure; noncalcareous; lower boundary clear and smooth.

5-8 **inches**
B_{21t}
LSL 3528

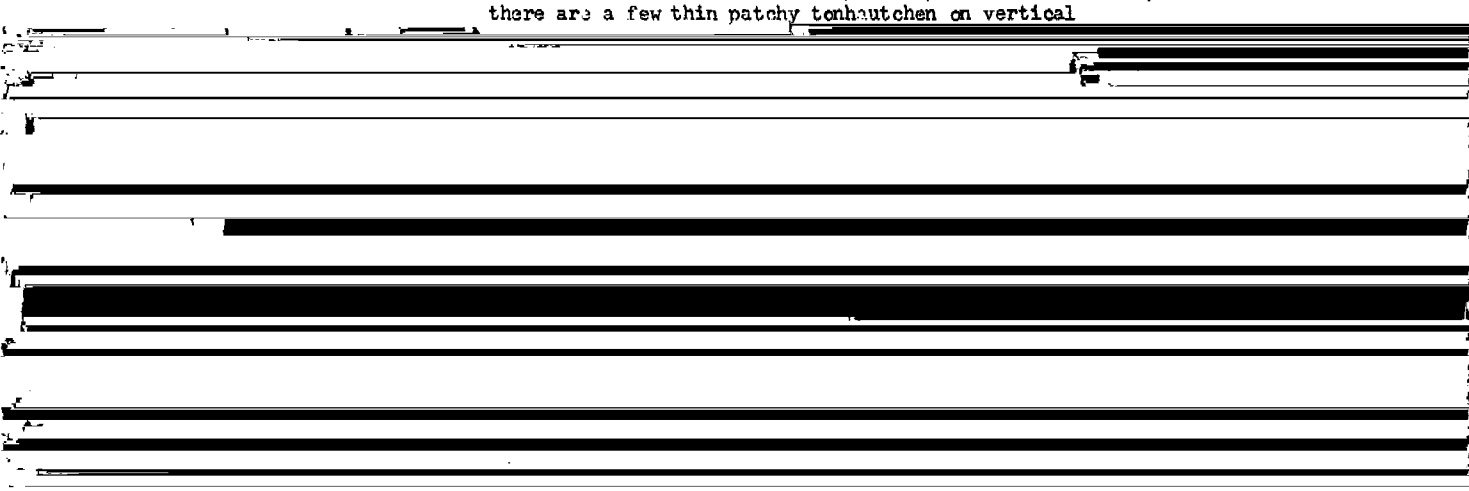
Brown (10YR 5/3 dry) to dark grayish brown (10YR 4/2.5 moist) silty clay loam; slightly hard when dry, friable when moist; weak to moderate, medium and fine prismatic structure breaking to moderate, fine, angular and subangular blocks; noncalcareous; moderate continuous tonhautchen; lower boundary clear and smooth.

8-15 **inches**
B_{22t}
LSL 3529

Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) silty clay loam; slightly hard to hard when dry, friable when moist; moderate to strong, medium prismatic structure breaking to moderate to strong, fine and very fine, angular and subangular blocks; weakly calcareous; thin nearly continuous tonhautchen; lower boundary gradual and smooth.

15-24 **inches**
B_{31ca}
LSL 3530

Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) silty clay loam; hard when dry, friable when moist; moderate to strong, medium prismatic structure breaking to moderate to strong, medium and fine, subangular blocks; strongly calcareous; this is a moderate lime horizon containing moderate numbers of large soft calcium carbonate concretions 1/4 to 1/8 inch in diameter; there are a few thin patchy tonhautchen on vertical



24-31 **inches**
B_{32ca}
LSL 3531

Pale brown (10YR 5.5/3.5 dry) to yellowish brown (10YR 4.5/4 moist) silty clay loam; very hard when dry, friable when moist; moderate, coarse subangular blocky structure; strongly calcareous; this is a moderate lime horizon and contains moderate numbers of large soft calcium carbonate concretions 1/4 to 1/8 inch in diameter; there are a few thin patchy tonhautchen; lower boundary gradual and smooth.

31-44 **inches**
C_{ca}
LSL 3532

Pale brown (10YR 5.5/3 dry) to brown (10YR 4.5/3 moist) light silty clay loam; hard when dry, friable when moist; weak, coarse subangular blocky structure; violently calcareous; this is a moderate to strong lime

SOIL SURVEY LABORATORY Lincoln, Nebr. 12/21/56

SOIL TYPE Baca clay loam **LOCATION** Baca Co., Colorado

SOIL NOS. S-55-Colo-5-4 **LAB. NOS.** 3535-3541

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-5	Ap	1.1	1.7	0.8	1.2	8.9	51.9	34.4	40.1	21.4	-	sicl
5-10	B21t	0.4	0.5	0.3	0.5	6.6	50.3	41.4	36.1	21.1	-	sic
10-16	B22t	0.2	0.2	0.2	0.5	4.7	56.4	37.8	33.1	28.3	-	sicl
16-30	B3ca	0.2	0 2	0.2	0.4	4.8	61.1	33.1	35.6	30.6	-	sicl
30-42	Cca	0.3	0.3	0.2	0.3	5.3	64.8	28.8	38.5	31.8	-	sicl
42-56	ABb	0.6	1.0	0.8	0.9	6.0	58.7	32.0	36.2	27.0	-	sicl
56-64+	B2b	1.0	2.2	1.5	1.7	7.2	48.6	37.8	34.0	21.9	-	sicl

	pH 8C1a		ORGANIC MATTER 6A1a	6B1a			ELECTRICAL CONDUCTIVITY EC x 10³ MILLIMHOS PER CM @25°C.	6E1a		MOISTURE TENSIONS		4B2
	1:5	1:10	ORGANIC CARBON	NITROGEN	C/N	EST% SALT (BUREAU CUP)		$CaCO_3$ equiv.	GYPSUM me./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
1:1			%	%				%		%	%	%
7.8	8.2	8.5	0.88	.101	9			1				15.5
7.3	7.7	7.8	0.87	.096	9			-				19.5
7.7	8.4	8.6	0.74	.081	9			13				16.8
8.4	8.9	9.0	0.42	.045	9			11				15.4
8.3	8.9	9.2	0.27	.030	9			8				15.3
8.1	8.7	9.0	0.20	.028				6				15.0
8.0	8.6	8.8	0.18	.027				4				15.8

5A1a CATION EXCHANGE CAPACITY	EXTRACTABLE CATIONS 6M2b	6O2b		6P2a	6Q2a		SATURATION EXTRACT SOLUBLE			MOISTURE AT SATURATION
NH_4Ac	Ca	Mg	N	Na	K		Na	K		%
	milliequivalents per 100g. soil →						← milliequivalents per liter →			
27.1		6.1		0.1	1.5					

Soil Type: Baca clay loam
Location: 650 feet west of the northeast corner of Sec. 3; T29S, R48W, Baca County, Colorado.
Date of Sampling: October 4, 1955
Collector: A. J. Cline Described by: A. J. Cline

Topography: Very gently sloping slightly convex surface facing east; approximately 1-2 percent slope.
Drainage: Well drained
Vegetation: Winter wheat
Use: Tilled field
Soil Nos.: 855Colo-5-4 Lincoln Laboratory Nos.: 3535-3541

0-5 inches A_p LSL 3535	Light brownish gray (10YR 6/2.5 dry) to dark grayish brown (10YR 4/2.5 moist) light silty clay loam; soft when dry. very friable when moist; moderate, fine granular structure; noncalcareous; lower boundary abrupt and smooth.
5-10 inches B_{21t} LSL 3536	Grayish brown (10YR 5/2.5 dry) to dark grayish brown (10YR 4/2.5 moist) silty clay loam; slightly hard when dry, friable when moist; moderate, fine prismatic structure breaking to moderate to strong, fine and very fine, angular and subangular blocks; noncalcareous; moderate continuous tonhautchen; lower boundary clear and smooth.
10-16 inches	Light brownish gray (10YR 6/2.5 dry) to grayish brown

LSL 3537	when dry, very friable when moist; moderate, fine prismatic structure breaking to moderate to strong, fine, angular and subangular blocks; weakly calcareous;

SOIL SURVEY LABORATORY Lincoln, Nebr. May 1959

SOIL TYPE Baca loam **LOCATION** Prowers County, Colorado

SOIL NOS. S58Colo-50-1 **LAB. NOS.** 9667-9674

DEPTH INCHES	HORIZON	1H1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-2	A1p	0.3	1.4	1.4	4.5	26.3	37.8	28.3	54.6	12.7	-	cl
2-6	B2t	<0.1	0.5	0.6	2.2	16.0	41.3	39.4	45.1	13.9	-	sicl
6-11	B2ca	<0.1	0.3	0.4	1.2	9.1	52.8	36.2	38.9	23.9	-	sicl
11-18	B3ca	0.1	0.1a	0.2a	0.5a	8.0a	59.7	31.4	42.0	26.1	-	sicl
18-26	Cca	<0.1	<0.1	<0.1	0.4a	7.6a	64.0	28.0	45.8	26.1	-	sicl
26-33	C1	<0.1	<0.1	<0.1	0.4a	8.4a	70.3	20.9	47.9	31.1	-	sil
33-44	C2	<0.1	<0.1	<0.1	0.4a	9.3a	73.3	17.0	53.3	29.6	-	sil
44-60	C3	<0.1	<0.1	<0.1	0.4a	8.8a	73.7	17.1	52.5	30.3	-	sil

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.9			0.96	0.098	10	<0.20	0.7	1				11.7
7.7			0.83	0.097	8	<0.20	0.5	1				16.2
7.9			0.65	0.075	9	<0.20	0.5	6				16.0
8.1			0.42	0.052	8	<0.20	0.5	11				13.9
8.2			0.31	0.038	8	<0.20	0.5	12				12.7
8.4			0.24			<0.20	0.7	10				11.8
8.3			0.19			<0.20	1.3	8				10.8
7.8			0.19			0.46	6.7	6				10.7

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6G2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	5D2 EXCH. Na %	8A1 SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	6J1a HCO_3^-	6K1a Cl^-	6I1a $SO_4^=$	8A MOISTURE AT SATURATION %
←	milliequivalents per 100g. soil →						← milliequivalents per liter →					
17.7		3.2	<0.1	<0.1	1.8	<1	0.4	1.0				52.1
22.7	20.8	5.6	0.8	0.1	1.2	<1	0.4	0.3				64.8
20.2				0.1	0.9	<1	0.6	0.2				64.9
17.2				0.3	0.8	1	1.2	0.3				61.0
16.1				0.7	0.9	4	2.6	0.3				57.2
16.3				1.4	1.1	7	4.3	0.3				51.8
16.0				2.1	1.1	11	8.1	0.4				52.8
16.8				3.4	1.1	10	32.0	1.3	1.6	47.9	20.4	53.9

Soil Type: Baca Loam
Classification: Brown
Location: 3 mile E., 0.5 mile S., NW corner of Section 5, T21S., R46W, Prowers County, Colorado.
Date Sampled: November 4, 1958
Climate: Continental climate, average annual precipitation 13.00 inches, elevation 3,860 feet. Frost-free season 160 days.
Vegetation: Dryland, wheat. **Parent Material:** Loess.
Physiographic position: Upland. **Relief:** Nearly level, 0-1%. **Drainage:** Well
Moisture: Dry, slightly moist below four feet. **Watertable:** None encountered.
Stoniness: None. **Salt or Alkali:** None observered other than calcium carbonate.
Erosion: Slight to moderate wind erosion.
Soil Nos. S-58-Colo-50-1
Described by: E. Milton Payne
Lincoln Horizon
Lab. No.

9667	A_1p	0-2 inches	Brown (10YR 5/3, dry) to dark grayish brown (10YR 4/2.5 moist) (10YR 4/2 moist crushed) loam; weak coarse platy breaking to weak fine granular structure; soft when dry, very friable moist; slightly calcareous; clear wavy boundary.
9668	B_{2t}	2-6 inches	Brown (10YR 4/3 dry) to dark brown (10YR 3.5/3 moist) and crushed silty clay loam; moderate medium prismatic structure breaking to moderate medium to fine subangular blocky structure hard when dry, friable moist; thin continuous clay skins; noncalcareous; in the pit there was some disturbance of the upper portion of the horizon and platiness or a plow pan from cultivation was in evidence; gradual smooth boundary.
9669	B_{2ca}	6-11 inches	Brown (10YR 5/3 dry) to dark brown (10YR 4/3 moist) dark grayish brown (10YR 4/2.5 moist crushed) silty clay loam; moderate fine prismatic structure breaking to moderate medium subangular blocky structure; hard when dry, firm moist; thin continuous clay skins; strongly calcareous with a very few small lime nodules in evidence, otherwise the lime was well disseminated; clear smooth boundary.

SOIL SURVEY LABORATORY Lincoln, Nebr. May 1959

SOIL TYPE Baca loam **LOCATION** Prowers County, Colorado

SOIL NOS. S58Colo-50-10 **LAB. NOS.** 9718-9725

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-3	Ap	0.1	0.9	1.0	2.7	22.1	42.8	30.4	53.9	12.9	-	cl
3-6	B2t	0.1	1.1	1.1	2.5	17.6	41.2	36.4	47.0	13.6	-	cl
6-13	B2ca	0.2	0.5	0.6a	1.3a	9.6a	50.3	37.5	40.3	20.5	-	sicl
13-18	B3ca	0.1	0.1	0.1a	0.5a	7.9a	57.9	33.4	42.3	23.9	-	sicl
18-25	Cca	<0.1	0.1	0.1a	0.5a	8.1a	60.6	30.6	45.2	23.9	-	sicl
25-36	C1	0.1	0.1	0.1b	0.6b	8.5b	65.3	25.3	67.7	26.6	-	sil
36-45	C2	<0.1	<0.1	0.1a	0.5a	9.1a	69.9	20.4	51.5	27.9	-	sil
45-60+	C3	<0.1	<0.1	<0.1	0.5a	9.6a	72.1	17.8	52.7	29.4	-	sil

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.9			0.96	0.108	9	<0.20	1.0	1				11.4
7.9			0.94	0.104	9	<0.20	0.7	1				14.2
7.9			0.84	0.096	9	<0.20	0.7	5				15.4
8.0			0.48	0.061	8	<0.20	0.7	10				13.9
8.1			0.38	0.044	9	<0.20	0.7	12				12.7
8.3			0.26			<0.20	0.8	10				11.8
8.5			0.19			<0.20	0.8	9				11.1
8.2			0.16			<0.20	1.5	6				10.3

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS Ca	6C2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	(milliequivalents per 100g. soil)	5D2 EXCH. Na %	8A1 SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	(milliequivalents per liter)	8A MOISTURE AT SATURATION %
20.8		4.0	<0.1	<0.1	2.0		<1	0.4	1.0		57.5
25.2		6.1	0.4	<0.1	1.5		<1	0.4	0.4		62.9
25.1				<0.1	1.2		<1	0.5	0.4		68.0

Soil Type: Baca loam
Soil Nos.: S58Colo-50-10
Classification: Brown.
Location: 330 feet east, 100 feet south of N 1/4 corner, Sec. 10, T21S, R46W, Prowers County, Colorado.
Climate: Continental climate, average annual precipitation 14 to 15 inches, elevation 3,840 feet. Frost-free season 160 days.
Vegetation: Fallow.
Physiographic Position: Upland.
Relief: Nearly level, 0 to 1 percent slope.
Drainage: Well.
Moisture: Dry.
Water Table: None encountered.
Stoniness: None
Salt or Alkali: None observed.
Erosion: Slight to moderate, principally by wind.
Described by: E. Milton Payne, November 7, 1958.

Horizon and
Lincoln
Lab. No.

Ap
9718 — 0 to 3 inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3.5/3 moist) loam; weak fine granular structure; slightly hard when dry, friable when moist; slightly effervescent; abrupt smooth boundary caused by tillage implements.

B2t
9719 — 3 to 6 inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3.5/3 moist) silty clay loam; moderate medium prismatic breaking to moderate medium subangular blocky structure; hard when dry, friable when moist; thin nearly continuous clay skins; noncalcareous; clear smooth boundary.

B2ca
9720 — 6 to 13 inches. Brown (10YR 5/3 dry) to dark brown (10YR 4/3 moist) silty clay loam; moderate medium prismatic breaking to moderate fine subangular blocky structure; hard when dry, firm when moist; thin nearly continuous clay skins; strongly effervescent with a scattering of lime spots; clear smooth boundary.

B3ca
9721 — 13 to 18 inches. Light brownish gray (10YR 6/2.5 dry) to grayish brown (10YR 4.5/2 moist) silty clay loam; weak coarse prismatic structure breaking to moderate medium subangular blocks; hard when dry, firm when moist; thin patchy clay skins; violently effervescent with prominent lime mottles; gradual smooth boundary.

Cca
9722 — 18 to 25 inches. Pale brown (10YR 6/3 dry) to grayish brown (10YR 5/2.5 moist) light silty clay loam; weak coarse prismatic breaking to moderate medium subangular blocky structure; hard when dry, firm when moist; violently effervescent with prominent lime mottles; gradual smooth boundary.

C1
9723 — 25 to 36 inches. Very pale brown (10YR 6.5/3 dry) to brown (10YR 5/3 moist) silt loam; very weak very coarse prismatic structure breaking to weak coarse subangular blocks; slightly hard when dry, friable when moist; violently effervescent with a few lime streaks and mottles; gradual smooth boundary.

C2
9724 — 36 to 45 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) loam; very weak coarse subangular blocky structure; slightly hard when dry, friable when moist; violently effervescent; gradual smooth boundary.

C3
9725 — 45 to 60 inches plus. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) loam; massive; slightly hard when dry, very friable when moist; violently effervescent; this layer continued without change to 10 feet.

Bureau of Public Roads Samples:
Ap 0 to 3 inches
B2ca 6 to 13 inches
C2 36 to 45 inches.

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Bancroft silt loam SOIL Nos. S63Colo-18-7 LOCATION Douglas County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18679-18687 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05) [a]	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1b <0.0002	3A1a Noncarbonate Clay <0.002	Coarse fragments 2A2: > 2	2 – 19	19 – 76
		Pct. of < 2 mm													Pct.	Pct.	Pct. of < 76mm	
0-6	A1	28.1	52.3	19.6	0.4	2.1	2.4	6.0	17.2	29.7	22.6	50.7	10.9		20	tr		
6-9	B1	28.3	43.4	28.3	0.5	2.3	2.5	6.1	16.9	24.8	18.6	45.5	11.4		28	tr		
9-13	B21t	25.5	40.0	34.5	0.3	1.6	1.8	4.8	17.0	22.2	17.8	42.4	8.5		35	tr		
13-19	B22t	25.2	41.2	33.6	0.2	1.3	1.6	4.4	17.7	23.4	17.8	44.1	7.5	21.8	34	tr		
19-26	B23t	28.0	43.0	29.0	0.5	2.4	2.6	5.6	17.0	24.4	18.6	44.9	11.0		29	tr		
26-39	B3	31.7	42.0	26.3	0.5	3.3	3.4	7.0	17.5	25.2	16.8	46.9	14.2		26	tr		
39-51	B3ca	27.9	44.8	27.3	0.4	2.8	3.0	6.0	15.7	24.9	19.9	44.2	12.2		27	tr		
51-69	IIBcal	52.2	26.2	21.6	2.0	13.1	12.2	14.6	10.3	14.7	11.5	31.8	41.9	6.5	21	tr		
69-80	IICca2	60.4	21.5	18.1	2.3	15.5	15.5	18.4	8.7	12.0	9.5	29.0	51.7		17	tr		

Depth (In.)	6A1a Organic carbon [b]	6B1a Nitrogen	C/N	Carbonate as $CaCO_3$: 6E1b 6E2a <2 mm.	Carbonate as $CaCO_3$: 3A1a <0.002 mm.	6C2a Ext. Iron as Fe	Bulk density: 4A1a Field State	Bulk density: 4A1d 1/3-Bar	Bulk density: 4A1b Air Dry	4D1 COLE	Water content: 4B4 Field State	Water content: 4B1c 1/3-Bar	Water content: 4B2 15-Bar	Water content: 4C1 1/3- to 15-Bar		pH		8C1a (1:1)
	Pct.	Pct.		Pct.	Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct.	Pct.	In./In.				
0-6	3.12	0.241	13			0.7	1.23	1.21	1.24	0.007	18.3	26.5	9.5	0.21				5.6
6-9	1.33	0.139	10			0.7	1.49	1.36	1.44	0.020	7.8	19.8	11.0	0.12				6.5
9-13	0.87	0.093	9			0.8	1.57	1.42	1.57	0.036	8.6	21.3	14.0	0.10				6.7
13-19	0.76	0.071	11			0.8	1.62	1.47	1.63	0.036	8.9	21.2	13.0	0.12				6.7
19-26	0.52	0.051	10	-(s)		0.8	1.62	1.49	1.62	0.028	7.7	20.6	12.1	0.13				6.9
26-39	0.43			-(s)		0.6	1.41	1.30	1.41	0.028	7.5	21.6	10.7	0.14				7.2
39-51	0.45			3	tr	0.6	1.33		1.33	0.024	7.7		11.4					8.2
51-69	0.27			4	1	0.4	1.55	1.50	1.55	0.010	4.7	17.5	8.6	0.13				8.5
69-80	0.31			2	1	0.5	1.54	1.49	1.51	0.003	4.4	14.9	6.5	0.13				8.5

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap.: 5A3a Sum Cations	5A1a NH_4OAc	8D3 Ca/Mg	Base saturation: 5C3 Sum Cations	5C1 NH_4OAc
	meq/100 g									Pct.	Pct.
0-6	10.2	2.3	tr	1.0	13.5	7.7	21.2	16.6	4.4	64	81
6-9	12.4	3.9	0.1	1.0	17.4	4.2	21.6	18.0	3.2	81	97
9-13	16.3	5.1	0.1	0.8	22.3	3.8	26.1	22.4	3.2	85	100
13-19	16.9	5.4	0.1	0.6	23.0	3.1	26.1	23.0	3.1	88	100
19-26	15.9	5.2	0.2	0.5	21.8	2.5	24.3	20.6	3.1	90	106
26-39	14.8	4.7	0.2	0.4	20.1	1.5	21.6	18.7	3.1	93	107
39-51	14.5c	4.3d	0.5	0.5	19.8			17.9	3.4		
51-69	9.7c	3.2d	0.8	0.3	14.0			11.6	3.0		
69-80	8.3c	2.4d	1.0	0.4	12.1			9.4	3.5		

Depth (In.)	Ratios to Clay: 8D2 NH_4OAc CEC	8D2 Ext. Iron	8D1 15-Bar Water
0-6	0.85	0.04	0.48
6-9	0.64	0.02	0.39
9-13	0.65	0.02	0.41
13-19	0.68	0.02	0.39
19-26	0.71	0.03	0.42
26-39	0.71	0.02	0.41
39-51	0.66	0.02	0.42
51-69	0.55	0.02	0.40
69-80	0.55	0.03	0.36

a. Few grains of carbonate below 39 inches.
b. 16 kg/m² to 60 inches (Method 6A).
c. NH_4Cl-EtOH extraction (Method 6N3a).
d. NH_4Cl-EtOH extraction (Method 6O3a).

USDA-SCS-HYATTSVILLE, MD. 1964

Soil Type	:	*Bancroft silt loam
Soil Nos.	:	S63Colo-18-7
Location	:	1200 feet west, 600 feet north of the southeast corner of Section 21, T10S, R65W, Douglas County, Colorado
Climate	:	Continental; average annual precipitation 20 inches. Mean annual temperature 44 degrees F. Growing season 120 days. Elevation 7200 feet.
Vegetation	:	Native grass; blue grama, western wheatgrass, fringed sage and snakeweed
Parent Material	:	Aeolian silts and sands, probably local in origin
Physiographic Position	:	Upland
Relief	:	Nearly level, 2 percent north facing slope. Slope about 400 feet long, grading toward a small drainageway. Pit about 100 feet below the crest of the ridge
Drainage	:	Surface drainage slow; internal drainage medium; moderate intake rate
Moisture	:	Moist to 7 inches and below 4 feet. Usually moist throughout
Watertable	:	None
Stoniness	:	None
Salt or Alkali	:	None observed, other than calcium carbonate
Erosion	:	Slight water and wind
Sampled by	:	R. K. Dansdill, J. B. Brown, R. H. Jordan, and L. G. Shields; August 15, 1963
Described by	:	J. B. Brown

Horizon and Lincoln Lab. No.	
A1 18679	0 to 6 inches. Very dark brown (10YR 2/2 moist) silt loam; dark grayish brown (10YR 4/2 dry); weak medium subangular blocky structure breaking to moderate fine granules; soft when dry, very friable when moist; noncalcareous; clear smooth boundary.
B1 18680	6 to 9 inches. Very dark brown (10YR 2.5/2 moist) silt loam; dark grayish brown (10YR 4/2 dry) weak coarse subangular blocky structure; slightly hard when dry, very friable when moist; few thin patchy clay films on vertical ped faces; noncalcareous; clear smooth boundary.
B21t 18681	9 to 13 inches. Very dark grayish brown (10YR 3/2 moist) clay loam; grayish brown (10YR 4.5/2 dry); moderate medium and fine prisms breaking to strong fine subangular blocks; very hard when dry, firm when moist; thin nearly continuous clay films on ped surfaces; few bleached sand grains on ped surfaces; noncalcareous; clear smooth boundary.
B22t 18682	13 to 19 inches. Brown (10YR 4/3 moist) clay loam; brown (10YR 5/3 dry); moderate medium and fine prisms breaking to strong medium and fine angular and subangular blocks; very hard when dry, firm when moist; thin nearly continuous clay films; few bleached sand grains on ped surfaces; noncalcareous;gradual smooth boundary.
B23t 18683	19 to 26 inches. Brown (4/3 moist) clay loams; brown (10YR 5/3 dry); moderate medium and fine prisms breaking to moderate medium angular and subangular blocks; very hard when dry, firm when moist; thin nearly continuous clay films; noncalcareous; gradual smooth boundary.
B3 18684	26 to 39 inches. Brown (10YR 5/3 moist) loam; pale brown (10YR 6/3 dry); moderate medium prisms breaking to moderate medium subangular blocks; hard when dry, friable when moist; thin patchy clay films on ped surfaces; noncalcareous; clear slightly wavy boundary.
B3ca 18685	39 to 51 inches. Brown (10YR 5/3 moist) loam; very pale brown (10YR 7/3 dry); weak coarse prisms breaking to weak medium subangular blocks; slightly hard when dry, very friable when moist; very highly calcareous; few lime mycelia; few patchy clay films on vertical faces; clear smooth boundary.
IICcal 18686	51 to 69 inches. Yellowish brown (10YR 5/4 moist) loam; light yellowish brown (10YR 6.5/4 dry); weak coarse prisms; slightly hard when dry, very friable when moist; very highly calcareous; many lime mycelia and lime coatings on ped surfaces; diffuse boundary.
IICca2 18687	69 to 80 inches. Yellowish brown (10YR 5.5/4 moist) sandy loam; very pale brown (10YR 8/4 cry); massive structure; slightly hard when dry, very friable when moist; very highly calcareous; few lime mycelia; lime pockets 6 inches across; reddish brown structured clay occurring at 10 feet.

Remarks: The Bancroft series is evidently developing from aeolian silts and sands that contain at least small amounts of lime. Buried soils of clay loam texture with high chroma, developing in out-wash material, are not uncommon in this soil unit below a depth of 4 to 5 feet. This soil unit gradually grades into the Fondis Series as one goes from south to north in the County, and the outwash material of the Fondis Series may be a source of the parent material for this series. Soil temperature at 11.0 feet was 11.5 degrees C.

Bureau of Public Roads Samples: B22t and IICcal horizons.

Mineralogy:

Observations on very fine sand (Method 7B1): A1, B22t, and IICca2 horizons. Approximately 70 to 75 percent feldspar, 20 to 25 percent quartz, and 5 to 10 percent accessory minerals. Orthoclase is the predominant feldspar; microcline and low-calcium plagioclase are also present in lesser amounts. Most grains show some etching and pitting; minute inclusions occur in a number of the grains. Compound grains that appear as altered feldspar are common in the horizons examined. Biotite, hornblende, opaques, and zircon are the predominant accessory minerals. Biotite increases slightly with depth. Other minerals identified in trace amounts include epidote, zoisite, and pyroxene (diopside?); volcanic glass is absent. Mineralogy of the IICca2 horizon is similar to that of the A1 and B22t horizons.

Clay mineralogy (Method 7A1, 7A2): B22t and IICcal horizons. The B22t contains moderate amounts of montmorillonite, kaolinite, and mica (or illite) in about equal proportions. The crystalline quality of the kaolinite and mica is very good, the montmorillonite is of fair quality. The IICcal has the same suite of minerals in nearly the same proportions. The montmorillonite is of poorer crystalline quality. Clay mineralogy is mixed.

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Bancroft silt loam SOIL Nos. S63Colo-18-8 LOCATION Douglas County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18688-18696 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (in.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05) [a]	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1b <0.0002		Coarse fragments 2A2: ≥ 2	2–19	19–76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-5	A1	50.5	30.6	18.9	1.8	2.2	2.7	16.8	27.0	18.5	12.1	58.1	23.5	11.8		tr		
5-8	B1	41.4	31.2	27.4	0.5	1.4	2.0	13.4	24.1	17.6	13.6	51.8	17.3			tr		
8-12	B21t	36.0	32.5	31.5	0.1	1.0	1.6	11.2	22.2	18.1	14.4	48.9	13.8			tr		
12-18	B22t	37.1	32.6	30.3	0.2	0.7	1.4	11.3	23.5	16.9	15.7	49.2	13.6			tr		
18-26	B23t	37.7	34.3	28.0	0.3	1.1	1.6	11.4	23.3	18.7	15.6	50.6	14.4	16.4		tr		
26-34	B24t	36.7	35.5	27.8	0.5	1.1	1.5	10.0	23.6	19.9	15.6	51.0	13.1			tr		
34-40	B3ca	41.3	32.4	26.3	1.2	1.9	2.2	12.0	24.0	18.2	14.2	51.1	17.3			tr		
40-56	Cca	41.6	32.6	25.8	1.9	2.2	2.3	11.8	23.4	18.2	14.4	50.1	18.2			tr		
56-70	IIC	39.1	35.5	25.4	1.2	1.3	1.5	10.3	24.8	20.5	15.0	53.1	14.3	14.2		2		

Depth (in.)	6A1a Organic carbon [b]	6B1a Nitrogen	C/N		6E2a Carbonate as $CaCO_3$		Bulk density: 4A1a Field State	4A1d 1/3-Bar	4A1b Air Dry	4D1 COLE	Water content: 4B4 Field State	4B1c 1/3-Bar	4B2 15-Bar	4C1 1/3-to 15-Bar		pH: 8C1b Sat. Paste	8C1a (1:1)
	Pct.	Pct.			Pct.		g/cc	g/cc	g/cc		Pct.	Pct.	Pct.	In./in.			
0-5	1.90	0.147	13				1.37	1.37	1.39	0.003	16.7	17.4	7.6	0.13			5.7
5-8	1.23	0.120	10				1.36	1.36	1.41	0.014	16.9	19.5	9.9	0.13			6.2
8-12	0.91	0.092	10				1.55	1.43	1.56	0.028	8.4	20.9	11.5	0.13			6.5
12-18	0.65	0.061	11		-(a)		1.62	1.50	1.62	0.024	7.6	19.1	11.6	0.11			6.8
18-26	0.43	0.041	10		-(a)		1.62	1.49	1.62	0.028	7.3	20.2	11.4	0.13			7.3
26-34	0.31				-(a)		1.54	1.42	1.53	0.024	6.7	20.3	11.0	0.13			7.7
34-40	0.30				tr(a)		1.53	1.43	1.54	0.024	6.8	20.3	10.4	0.14			8.4
40-56	0.24				tr(a)		1.53	1.42	1.53	0.024	7.0	19.9	10.4	0.13		7.5	8.3
56-70	0.28				tr(a)		1.45	1.35	1.44	0.020	7.5	19.9	9.6	0.14			8.1

Depth (in.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap.: 5A3a Sum Cations	5A1a NH_4OAc	8A Water at Saturation	8A1a Elec. Cond.	8D3 Ca/Mg	Base saturation: 5C3 Sum Cations	5C1 NH_4OAc
	meq/100 g								Pct.	mmho/cm		Pct.	Pct.
0-5	7.9	2.1	0.1	0.6	10.7	5.1	15.8	11.9			3.8	68	90
5-8	12.3	3.6	0.1	0.4	16.4	4.2	20.6	15.9			3.4	80	103
8-12	15.2	4.0	0.1	0.4	19.7	3.4	23.1	19.0			3.8	85	104
12-18	15.2	4.4	0.2	0.4	20.2	3.0	23.2	19.2			3.5	87	105
18-26	13.8c	3.4d	0.4	0.4	18.0	1.6	19.6	18.0			4.1	92	100
26-34	14.1c	3.4d	0.7	0.4	18.6			17.9			4.1		
34-40	14.2c	3.3d	1.2	0.4	19.1			17.0			4.3		
40-56	14.1c	3.2d	1.7	0.3	19.3			16.9	40.7	1.55	4.4		
56-70	14.0c	2.8d	2.1	0.4	19.3			17.4			5.0		

Depth (in.)	Ratios to Clay: 8D1 NH_4OAc CEC		8D1 15-Bar Water		
0-5	0.63		0.40		
5-8	0.58		0.36		
8-12	0.60		0.37		
12-18	0.63		0.38		
18-26	0.64		0.41		
26-34	0.64		0.40		
34-40	0.65		0.40		
40-56	0.66		0.40		
56-70	0.69		0.38		

a. Few grains of carbonate below 40 inches.
b. 12 kg/m² to 60 inches (Method 6A).
c. NH_4Cl-EtOH extraction (Method 6N3a).
d. NH_4Cl-EtOH extraction (Method 603a).

Soil Type	:	*Bancroft silt loam
Soil Nos.	:	S63Colo-18-8
Location	:	650 feet west, 300 feet south of the northeast corner of Section 19, T10S, R66W, Douglas County, Colorado
Climate	:	Continental; average annual precipitation 18 to 20 inches. Mean annual temperature 44 degrees F. Growing season 120 days. Elevation 7200 feet.
Vegetation	:	Native grass; blue grama, Junegrass, western wheatgrass, mountain muhly and fringed sage
Parent Material	:	Aeolian silts and sands, probably local in origin
Physiographic Position	:	Upland
Relief	:	Sloping, 5 percent east facing slope. Slope is about 800 feet in length; pit located about midway on the slope
Drainage	:	Surface drainage rapid; internal drainage medium; moderate intake rates
Moisture	:	Moist to 8 inches and below 4 feet. Generally moist throughout
Watertable	:	None
Stoniness	:	Very few fine water worn gravels throughout
Salt or Alkali	:	None other than calcium carbonate observed
Erosion	:	Slight water erosion
Sampled by	:	R. K. Dansdill, J. B. Brown, R. H. Jordan, and L. G. Shields; August 15, 1963
Described by	:	J. B. Brown

Horizon and Lincoln Lab. No.	
A1 18688	0 to 5 inches. Very dark brown (10YR 2/2 moist) loam; dark grayish brown (10YR 4/2 dry); weak medium subangular blocky structure breaking to moderate fine granules; soft when dry, very friable when moist; noncalcareous; clear smooth boundary.
B1 18689	5 to 8 inches. Very dark brown (10YR 2.5/2 moist) loam; dark grayish brown (10YR 4/2 dry); weak medium subangular blocky structure; soft when dry, very friable when moist; few thin patchy clay films in the lower part of this horizon on vertical faces; slightly more clay than horizon above; noncalcareous; clear smooth boundary.
B21t 18690	8 to 12 inches. Dark brown (10YR 3/3 moist) clay loam; moderate medium and fine prisms breaking to strong fine subangular blocks; very hard when dry, firm when moist; thin nearly continuous clay films with some bleached sand grains on ped surfaces; noncalcareous; clear smooth boundary.
B22t 18691	12 to 18 inches. Brown (10YR 4/3 moist) clay loam; brown (10YR 5/3 dry); moderate medium to fine prisms breaking to strong medium to fine angular and subangular blocks; very hard when dry, firm when moist; dark streaks are common in this horizon, some of which are krotovinas; thin nearly continuous clay films; noncalcareous; clear smooth boundary.

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Bassel sandy loam LOCATION Chaffee County, Colorado

SOIL NOS. S58Colo-8-3 LAB. NOS. 9056-9061

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-2	A1	23.1a	18.2a	8.0a	8.1a	7.0a	25.5	10.1	25.5	11.1	10	cosl
2-4	B21t	23.7a	19.1a	8.1a	7.5a	5.4a	23.7	12.5	21.6	11.1	10	cosl
4-8	B22t	17.3a	20.6a	11.2a	10.9a	6.2a	20.6	13.2	22.9	9.3	23	cosl
8-21	B3	21.0a	20.1a	12.0a	12.9a	7.6a	15.2	11.2	23.7	5.7	24	cosl
21-42	C	16.0	20.1	11.8	17.0	9.1	16.0	10.0	27.3	5.8	24	cosl
42-50+	Cca	17.3	20.0	11.4	16.5	9.3	16.2	9.3	26.7	6.4	24	cosl

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron $\%Fe_2O_3$ 6C1a		6E1a $CaCO_3$ equivalent %		MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
5.5			2.75	0.195	14	1.2						6.3
6.1			1.48	0.130	11	1.1						5.8
6.6			0.93	0.094	10	1.4		<1				5.6
7.2			0.30	0.035	8	0.8		<1				4.0
7.8			0.10	0.013		0.8		<1				3.3
8.2			0.03			0.9		<1				3.7

5A1a CATION	EXTRACTABLE CATIONS 6N2b	6O2b	6H1a	6P2a	5B1a 6Q2a	BASE SAT. %	5C3 Base	Sum Bases	Sum Cations	Ca/Mg

Soil Type: Bassel sandy loam. **Described by:** A. J. Cline
Location: SW¼ of Sec. 23, T14S, R77W, Chaffee County, Colorado.
Date of Sampling: September 1957
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline.
Physiographic Position: Side slope of a high mountain valley at an elevation of approximately 9,300 feet.
Topography: A moderate convex slope of approximately 4 percent facing west.
Drainage: Well drained. **Vegetation:** Ring muhly, blue grama, sage, and fescue.
Use: National Forest Service land.
Soil Nos.: S58Colo-8-3

Lincoln Lab. No.	Horizon		
9056	A_1	0-2 inches	Brown (10YR 5/3 dry) to dark brown (10YR 3/3 moist) sandy loam; soft when dry, very friable when moist; moderate fine granular structure; noncalcareous; approximately 15 percent of this horizon is gravel; lower boundary clear and smooth.
9057	B_{21t}	2-4 inches	Brown or dark brown (7.5YR 4/4 dry) to dark brown (7.5YR 3/4 moist) gravelly sandy clay loam; hard when dry, very friable when moist; weak medium prismatic structure breaking to weak to moderate medium subangular blocks; noncalcareous; there are thin patchy clay skins on both the horizontal and vertical faces of most of the soil aggregates; approximately 15 percent of this horizon is gravel; lower boundary clear and smooth.
9058	B_{22t}	4-8 inches	Brown (7.5YR 5/4 dry) to dark brown (7.5YR 3.5/4 moist) gravelly sandy clay loam; hard when dry, very friable when moist; weak medium prismatic structure breaking to weak to moderate medium subangular blocks; noncalcareous; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; approximately 15 percent of this horizon is gravel; lower boundary gradual and smooth.
9059	B_3	8-21 inches	Light brown (7.5YR 6/3 dry) to dark brown (7.5YR 4/3 moist) gravelly heavy sandy loam; hard when dry, very friable when moist; weak medium subangular blocky structure; noncalcareous; there are a few thin patchy clay skins principally on the vertical faces of the soil aggregates; approximately 15 percent of this horizon is gravel; lower boundary gradual and smooth.
9060	C	21-42 inches	Light brown (8.75YR 6/3 dry) to brown or dark brown (8.75YR 4/3 moist) gravelly sandy loam; hard when dry, very friable when moist; weak medium subangular blocky structure noncalcareous; approximately 25 percent of this horizon is gravel; lower boundary is diffuse and irregular.
9061	Cca	42-50+ inches	Pale brown (10YR 6/3 dry) to brown or dark brown (10YR 4/3 moist) gravelly sandy loam; hard when dry, very friable when

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Bassel sandy loam **LOCATION** Chaffee County, Colorado

SOIL NOS. S58Colo-8-12 **LAB. NOS.** 9095-9100

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-3	A1	22.1	15.5	7.9	13.7	11.6	20.9	8.3	30.8	8.6	14	cosl
3-6	AB	13.6	13.7	10.9	18.7	11.0	16.1	16.0	28.6	7.4	12	cosl
6-14	B2t	16.0	14.9	12.0	16.6	10.7	12.8	17.0	27.0	5.5	11	cosl
14-21	B3ca	18.5	16.2	10.6	16.5	11.5	12.5	14.2	27.7	5.5	22	cosl
21-32	Cca	28.8	17.5	7.4	9.1	4.4	11.8	21.0	12.7	8.0	36	scl
32-46+	C	29.9	25.8	9.7	8.9	3.2	9.7	12.8	9.8	7.1	25	cosl

	pH		ORGANIC MATTER			Free Iron		6E1a		MOISTURE TENSIONS		
8C1a			6A1a	6B1a								4B2
1:1	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N	$\%Fe_2O_3$ 6C1a		$CaCO_3$ equivalent %		1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
5.9			0.92	0.090	10	1.5						3.9
6.9			0.89	0.070	13	1.9		<1				6.2
7.4			0.54	0.047	11	1.9		<1				7.4
8.2			0.26	0.020	13	1.8		2				6.0
8.5			0.32	0.026	12	0.8		12				9.1
8.3			0.05			1.5		3				6.3

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	Sum Bases 5B1a	Sum Cations 5A3a	Ca/Mg 8D3
← milliequivalents per 100g. soil →								← me/100g →		
8.0	4.8	1.2	4.0	<0.1	0.5	81	62	6.5	10.5	4.0
13.6	10.7	3.0	2.0	<0.1	0.6	105	88	14.3	16.3	3.6
15.9	12.8	3.8	1.6	<0.1	0.6	108	91	17.2	18.8	3.4
13.6		4.1	0.8	0.1	0.6					
16.5		5.2	<0.1	0.6	0.6					
11.9		5.9	<0.1	0.9	0.4					

Soil Type: Bassel Sandy Loam. **Described by:** A. J. Cline.
Location: SW¼ of Sec. 23, T14W, R78W, Chaffee County, Colorado.
Date of Sampling: September 1957
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline.
Physiographic Position: Side slope of a mountain valley at elevation of approximate 9,200 feet.
Topography: A moderate convex slope of approximately 5 percent facing south.
Drainage: Well drained.
Vegetation: Blue grama, rabbit brush, sage, winterfat and scattered pinon.
Use: National Forest Service lands.
Soil Nos.: S58Colo-8-12

Lincoln Lab. No.	Horizon		
9095	A_1	0-3 inches	Brown (10YR 5/3 dry) to dark brown (10YR 3/3 moist) gravelly sandy loam; soft when dry, very friable when moist; moderate fine granular structure; noncalcareous; lower boundary clear and smooth. Approximately 10 percent of this horizon is gravel.
9096	AB	3-6 inches	Dark grayish brown (10YR 4/2 dry) to very dark grayish brown (10YR 3/2 moist) sandy loam; slightly hard when dry, very friable when moist; moderate medium prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates in this horizon; approximately 15 percent of the horizon is gravel; lower boundary gradual and smooth.
9097	B_{2t}	6-14 inches	Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 moist) sandy clay loam; hard when dry, friable when moist; moderate medium prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are thin continuous clay skins on the surfaces of the soil aggregates; approximately 15 percent of this horizon is gravel; lower boundary gradual and smooth.
9098	B_{3ca}	14-21 inches	Brown or pale brown (10YR 5.5/3 dry) to brown (10YR 4.5/3 moist) gravelly light sandy clay loam; hard when dry, friable when moist; weak medium prismatic structure breaking to weak medium subangular blocks; strongly effervescent; this is a weak horizon of lime accumulation with visible lime occurring as concretions; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; approximately 25 percent of this horizon is gravel, lower boundary gradual and smooth.
9099	C_{ca}	21-32 inches	Very pale brown (10YR 7/3 dry) to pale brown (10YR 6/3 moist) gravelly sandy loam, slightly hard when dry, very friable when moist; massive violently effervescent; this is a strong horizon of lime accumulation with visible lime occurring in finely divided forms and as concretions; approximately 30 percent of this horizon is gravel; lower boundary diffuse and smooth.
9100	C	32-46 + inches	Pale brown (10YR 6/3 dry) to yellowish brown (10YR 5/4 moist) gravelly sand; slightly hard when dry, very friable when moist; massive; violently effervescent; this is a weak horizon of lime accumulation with some visible lime occurring in concretions usually about 1/4 inch in diameter, and with some visible lime in finely divided forms and some in thin seams and streaks; approximately 40 or 50 percent of this horizon is gravel.

SOIL SURVEY LABORATORY Lincoln, Nebr. January 1960

SOIL TYPE *Bijou loamy sand LOCATION Morgan County, Colorado

SOIL NOS. S59Colo-44-3 LAB. NOS. 10841-10848

DEPTH INCHES	HORIZON	1H1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2	
0-		1.0-	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	<0.002				<10	

Soil Type: *Bijou loamy sand
Soil Nos.: 859Colo-44-3
Field classification: Brown.
Location: 190 feet west, 175 feet north of southeast corner, Sec. 25, T4N, R59W, Morgan County, Colorado.
Photo: YE-1F-149.
Climate: Continental, average annual precipitation 13-15 inches. Elevation 4,450 feet. Frost-free season 146 days. Mean annual temperature 48° F.
Vegetation: Sand dropseed, sand sage, blue grama, few annual weeds.
Parent material: Arkosic alluvium.
Physiographic position: Terrace.
Relief: Nearly level 0-1 percent slope.
Drainage: External slow, internal rapid.
Moisture: Moist to 35 inches at time of sampling.
Water table: None
Stoniness: Few small gravels throughout profile.
Salt or alkali: None observed other than calcium carbonate at the 88- to 91-inch level.
Erosion: Slight.
Described by: Clayton F. Spears, May 5, 1959.
Remarks: Krotovinas of worms and insects AB to C1 horizon. Few streaks lime 88-91 inches.

Horizon and
Lincoln
Lab. No.

A11
10841 — 0 to 4 inches. Light brownish gray (10YR 5.5/2 dry) to dark brown (10YR 3.5/3 moist and crushed) loamy sand; weak fine crumb structure; soft when dry, very friable moist; noncalcareous; lower boundary clear and smooth.

A12
10842 — 4 to 10 inches. Brown (10YR 5/3 dry) to dark brown (10YR 3.5/3 moist and crushed) loamy sand; weak medium crumb structure; soft when dry, very friable moist; noncalcareous; lower boundary gradual, smooth.

A13
10843 — 10 to 15 inches. Brown (10YR 5/3 dry) to brown (10YR 4/3 moist and crushed) loamy sand; weak medium subangular blocky structure; soft when dry, friable moist; noncalcareous; lower boundary clear and smooth.

B1
10844 — 15 to 19 inches. Brown (10YR 5/3 dry) to brown (10YR 4/3 moist and crushed) sandy loam; weak medium subangular blocky structure; slightly hard when dry, friable moist; very thin patchy clay skins on vertical faces of soil aggregates; noncalcareous; lower boundary clear and smooth.

B2t
10845 — 19 to 28 inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3/2.5 moist) brown (10YR 4/3 crushed) sandy loam; weak coarse prismatic structure breaking to weak coarse and few medium subangular blocks; very hard when dry, friable moist; thin patchy clay skins on both horizontal and vertical faces of the soil aggregates; noncalcareous; lower boundary clear and wavy.

B3
10846 — 28 to 33 inches. Light olive brown (1.25Y 5.5/4 dry) to olive brown (1.25Y 4/3 moist) (1.25Y 4.5/3) crushed) coarse loamy sand; very weak coarse subangular blocky structure; very hard when dry, friable moist; very thin patchy clay skins horizontal and vertical faces of soil aggregates; noncalcareous; lower boundary clear and smooth.

C1
10847 — 33 to 39 inches. Light yellowish brown (2.5Y 5.5/3 dry) to light olive brown (2.5Y 4.5/3 moist and crushed) coarse loamy sand; massive; hard when dry, friable moist; noncalcareous; lower boundary clear and smooth.

C2
10848 — 39 to 60 inches. Lighty yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist and crushed) coarse loamy sand; massive; hard when dry, friable moist; noncalcareous; lower boundary gradual and smooth.

C3 — 60 to 88 inches. Light yellowish brown (2.5Y 6.5/3 dry, 2.5Y 6/3 moist and crushed) gravelly sand; massive; slightly hard dry, friable moist; noncalcareous; lower boundary clear and smooth.

C4 — 88 to 105 inches. Pale yellow (2.5Y 7/3 dry) to light yellowish-brown (2.5Y 6/3 moist) sandy loam; massive; slightly hard dry, friable moist; noncalcareous, except for 2 thin seams of slightly calcareous material at 88-91 inch level. Lower boundary clear and smooth.

105 inches plus. Pale yellow (2.5Y 7/3 dry) to light yellowish brown (2.5Y 6/3 moist) coarse loamy sand.

Bureau of Public Roads samples:

A12 — 4-10 inches

B2t — 19-28 inches

C1 — 39-60 inches

SOIL SURVEY LABORATORY Lincoln, Nebr. January 1960

SOIL TYPE *Bijou loamy sand **LOCATION** Morgan County, Colorado

SOIL NOS. S59Colo-44-4 **LAB. NOS.** 10849-10857

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	3A1 2A2 > 2 (<19mm)	TEXTURAL CLASS
0-3	A11	4.0	11.6	20.5	42.5	11.7	6.5	3.2	35.7	2.8	Tr.	s
3-13	A12	2.9	11.5	19.6	44.4	12.5	4.8	4.3	36.8	1.9	Tr.	s
13-17	B1	5.2	12.4	16.3	33.2	12.2	12.0	8.7	33.6	5.5	Tr.	ls
17-20	B21t	6.3	14.8	16.2	27.0	9.8	12.5	13.4	28.7	5.6	Tr.	sl
20-29	B22t	8.2	19.9	17.2	22.7	6.8	9.0	16.2	20.9	4.5	Tr.	cosl
29-34	B3	6.5	20.3	19.5	27.1	7.3	7.7	11.6	21.9	4.2	Tr.	cosl
34-44	C1	16.2	23.4	16.6	21.4	6.1	6.5	9.8	17.2	4.5	8	lcos
44-52	C2	15.2	22.9	18.2	23.4	5.8	6.5	8.0	17.6	4.1	9	lcos
52-60	C3	17.3	25.1	16.9	20.5	5.2	6.3	8.7	16.4	3.5	6	lcos

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM	6K1a $CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.0			0.27	0.026	10			<1				1.6
7.5			0.22	0.023	10			<1				1.9
7.7			0.31	0.037	8			<1				3.9
7.4			0.34	0.036	9			<1				6.1
7.2			0.27	0.035	8			<1				6.8
7.4			0.15					<1				4.5
7.5			0.09					<1				3.6
7.5			0.05					<1				2.8
7.7			0.04					<1				3.3

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6Q2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	Base Sat. % on Sum Cations 5C3	Sum Ext. Bases 5B1a	Sum Ext. Cations 5A3a	Ca/Mg 8D3	4A1h O. D. Bulk Density g/cc	MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →												
3.3	2.3	0.7	1.2	<0.1	0.3	100	73	3.3	4.5			
3.6	2.7	0.9	0.5	<0.1	0.3	108	89	3.9	4.4			
6.9	5.3	1.4	1.0	<0.1	0.4	103	88	7.1	8.1	3.8		
9.9	7.7	2.3	1.4	<0.1	0.5	106	88	10.5	11.9	3.3		
11.7	9.0	2.7	1.0	0.1	0.5	105	92	12.3	13.3	3.3	1.81	
8.5	6.3	2.0	1.0	<0.1	0.3	101	90	8.6	9.6	3.2		
8.1	6.3	2.1	0.7	<0.1	0.2	106	92	8.6	9.3	3.0		
6.4	5.2	1.5	0.7	<0.1	0.2	108	91	6.9	7.6	3.5		
6.4	5.7	1.7	0.5	0.2	0.2	122	94	7.8	8.3	3.4		

Soil Type: *Bijou loamy sand
Soil Nos.: S59Colo-44-4
Field classification: Brown.
Location: 700 feet east, 550 feet south of west quarter corner, Sec. 16, T4N, R59W, Morgan County, Colorado.
Photo: YE-4F-196.
Climate: Continental, average annual precipitation 13-15 inches. Elevation 4,470 feet. Frost-free season 146 days. Mean annual temperature 48° F.
Vegetation: Blue grama, sand dropseed, sand sage, few annual weeds.
Parent material: Arkosic alluvium.
Physiographic position: Terrace.
Relief: Nearly level 0-1 percent slope.
Drainage: Slow external, rapid internal.
Moisture: Moist to 41 inches at time of sampling. Water table: None.
Stoniness: Few small gravels throughout profile. Salt or alkali: None observed.
Erosion: Slight to none. Described by: Clayton F. Spears, May 5, 1959.
Remarks: Approximately same distance from Bijou Creek or source of alluvium as S59Colo-44-3. Many krotovinas

Horizon and Lincoln Lab No.

A11 10849 — 0 to 3 inches. Brown (10YR 5/3 dry) to dark brown (10YR 3.5/3 moist and crushed) loamy sand, very weak fine crumb structure; soft when dry, very friable moist; noncalcareous; slightly more organic material or organic stain and more plentiful roots than horizon below; lower boundary clear and smooth.

A12 10850 — 3 to 13 inches. Pale brown (10YR 5.5/3 dry) to brown (10YR 4/3 moist and crushed) loamy sand; very weak fine crumb structure; soft when dry, very friable moist; noncalcareous; lower boundary clear and smooth.

B1 — 13 to 17 inches. Brown (10YR 5/3 dry) to dark brown (10YR 3.5/3 moist) dark grayish brown (10YR 4/2

10851 — crushed) loamy sand; weak medium subangular blocky structure, soft when dry, very friable moist; noncalcareous; lower boundary clear and smooth.

B21t 10852 — 17 to 20 inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3/3 moist) (10YR 3.5/3 crushed) sandy loam; weak coarse prismatic structure breaking to weak medium and coarse subangular blocks; hard when dry, friable moist; thin patchy clay skins on vertical and horizontal faces of soil aggregates; noncalcareous; lower boundary clear and smooth.

B22t 10853 — 20 to 29 inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3/3 moist) few streaks dark grayish brown (10YR 4/2 moist) sandy loam; weak coarse prismatic breaking to weak medium and coarse subangular blocks; very hard when dry, friable moist; thin nearly continuous clay skins on both vertical and horizontal faces of soil aggregates; noncalcareous; lower boundary clear and wavy.

B3 10854 — 29 to 34 inches. Brown (10YR 5/3 dry, 10YR 4/3 moist) dark grayish brown (10YR 4/2 crushed) coarse sandy loam; weak coarse subangular blocky structure; hard when dry, friable moist; very thin patchy clay skins on vertical and horizontal faces of soil aggregates; noncalcareous; lower boundary clear and smooth.

C1 10855 — 34 to 44 inches. Light yellowish brown (2.5Y 6/3 dry) to olive brown (2.5Y 4/3 moist and crushed) coarse sandy loam; massive; slightly hard dry, friable when moist; noncalcareous; this horizon contains a few thin seams of clayey material and few small clay balls. Lower boundary clear and smooth.

C2 10856 — 44 to 52 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) loamy coarse sand; massive; slightly hard when dry, friable moist; noncalcareous; lower boundary clear and smooth.

C3 10857 — 52 to 82 inches. Sampled 52 to 60 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) coarse sand; massive; slightly hard dry, friable moist; noncalcareous; lower boundary clear and smooth.

C4 — 82 to 114 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) coarse and very coarse sand with some small gravels; noncalcareous.

Bureau of Public Roads samples:

A12 — 3-13 inches

B22t — 20-29 inches

C2 — 44-52 inches

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Bobtail gravelly loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2749-2754

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	> 2	TEXTURAL CLASS
2-0	Ao-Aoo											
0-4	A2	14.9	15.4	7.0	12.1	7.6	35.0	8.0	28.7	20.0		cosl
4-14	B2	21.8	17.3	7.5	13.9	8.8	24.2	6.5	25.6	14.6		cosl
14-33	B3	27.9	18.9	7.4	13.1	7.8	19.8	5.1	22.4	12.0		lcos
33-56	C	25.8	21.1	8.8	14.6	7.4	18.1	4.2	21.6	11.3		lcos
56-118	D	30.4	17.8	6.0	11.4	6.7	19.7	8.0	20.1	12.3		cosl

	pH		ORGANIC MATTER									
8C1a 1:1	1:5	1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C'N							
4.8			2.44	.061	40							
5.3			0.47	.030	16							
5.4			0.27	.013	21							
5.8			0.22									
6.0			0.18									

[redacted]

Soil Type: Bobtail gravelly loam
Location: NW 1/4 of Sec. 8, T2S, R76W, Grand County, Colorado. West St. Louis Creek.
Physiographic Position: Upland.
Topography: Steeply sloping mountain side facing south.
Drainage: Well drained.
Vegetation: Lodgepole pine.
Use: National Forest Service land.
Collected and Described by: John L. Retzer, September 11, 1955.

Horizon and Lincoln Lab. No.	
Ao - Aoo 2749	2 to 0 inch. An organic layer made up of partially decomposed or undecomposed organic debris, mainly needles, twigs, bark.
A2 2750	0 to 4 inches. Light brownish gray (10YR 6/2 dry) to grayish brown (10YR 5/2 moist) gravelly loam; soft when dry, very friable when moist; weak to moderate medium platy structure; very strongly acid; approximate pH 4.7; lower boundary gradual and smooth.
B2 2751	4 to 14 inches. Pale brown (10YR 6/3 dry) to brown or dark brown (10YR 4/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure; very strongly acid, approximate pH 4.9; lower boundary gradual and smooth.
B3 2752	14 to 33 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; strongly acid, approximate pH 5.3; lower boundary diffuse and smooth.
C 2753	33 to 56 inches. Very pale brown (10YR 7/3 dry) to pale brown (10YR 6/3 moist) partially weathered gneiss and schist bedrocks with the cracks between the stone filled with a gravelly loamy sand or sandy loam. Medium acid, approximate pH 5.8.
D 2754	56 to 118 inches. Only slightly weathered fractured bedrock. Cracks between the rocks are filled with gravelly sandy loam weathered from the rocks themselves.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Bobtail gravelly loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2755-2760

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent)								3A1	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
2-0	Ao-Ao3											
0-3	A2	12.0	14.7	7.6	13.2	8.4	35.4	8.7	30.2	20.6		cosl
3-18	B2	12.4	16.3	8.2	14.9	9.6	31.5	7.1	30.8	18.2		cosl
18-42	B3	46.7	20.6	5.8	8.3	4.4	11.0	3.2	13.0	6.6		lcos
42-54	C	19.5	19.0	10.0	15.8	9.2	17.7	8.8	26.4	9.4		cosl

Soil Type: Bobtail gravelly loam
Location: NW 1/4 of Sec. 8, T2S, R76W, Grand County, Colorado. West St. Louis Creek.
Physiographic Position: Upland, mountain slope.
Topography: Steeply sloping mountain side having a gradient of approximately 30 percent facing south.
Drainage: Well drained.
Vegetation: Principally lodgepole pine.
Use: National Forest Service land.
Collected and Described by: John L. Retzer, September 11, 1952.

Horizon and Lincoln Lab. No.	
Ao - Aoo 2755	2 to 0 inches. An organic mat made up of partially decomposed or undecomposed forest litter mainly of pine needles, bark and twigs. Very strongly acid, approximate pH 5.0.
A2 2756	0 to 3 inches. Grayish brown or light brownish gray (10YR 5.5/2 dry) to dark grayish brown or grayish-brown (10YR 4.5/2 moist) gravelly sandy loam; soft when dry, very friable when moist; very weak medium platy structure breaking to weak to moderate medium granules; very strongly acid, approximate pH 4.7; lower boundary clear and smooth.
B2 2757	3 to 18 inches. Brown (10YR 5/3 dry) to brown to dark brown (10YR 4/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure; very strongly acid, approximate pH 4.8; lower boundary gradual and smooth.
B3 2758	18 to 42 inches. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) gravelly loamy sand; slightly hard when dry, friable when moist; massive; medium acid, approximate pH 5.5; lower boundary diffuse and smooth.
C 2759	42 to 54 inches. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) gravelly sandy loam; slightly hard when dry, friable when moist; massive; medium acid, approximate pH 5.7; lower boundary diffuse and smooth. This horizon contains a large amount of partially weathered bedrock fragments.
D 2760	54 to 118 inches. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) gravelly loamy sand; this is a horizon of only partially weathered bedrock, gneiss, and schist, with some finer textured material in the cracks between the stones.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Bobtail gravelly sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2773-2777

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									> 2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002		
0-5	A2	15.8	10.8	5.8	14.3	10.6	36.1	6.6	34.3	20.3		cosl
5-16	B2	6.4	10.0	8.5	23.4	16.6	28.3	6.8	42.9	15.4		fsl
16-24	B3	8.3	12.7	8.8	23.3	15.6	24.0	7.3	40.1	12.6		sl
24-45	C	13.6	18.5	10.3	22.4	13.8	16.6	4.8	35.5	7.2		lcos
45-71	D	15.1	18.0	10.1	23.3	13.9	15.6	4.0	36.3	5.8		lcos

	pH		ORGANIC MATTER									
8C1a 1:1	1:5	1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N							
4.9			1.06	.034	31							
5.2			0.36	.016	22							
5.3			0.14	.010								
5.7			0.08									
5.8			0.11									

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a					BASE SAT. % NH_4Ac EXCH.	Base Sat. % on Sum Cations	5B1a Sum Bases	5A3a Sum Cations		8D3 Ca/Mg
	6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K						
← milliequivalents per 100g. soil →						5C1	5C3	me/100g	me/100g		
13.3	4.0	0.8	7.6	0.2	0.3	40	41	5.3	12.9		
10.8	3.8	1.0	5.0	0.1	0.4	49	51	5.3	10.3		3.8
9.3	3.3	1.2	3.7	0.1	0.3	53	57	4.9	8.6		2.8
7.4	3.5	1.1	2.7	0.1	0.2	66	64	4.9	7.6		3.2
9.4	4.8	2.2		0.1	0.2	78		7.3			2.2

Soil Type: Bobtail gravelly sandy loam
Location: Along road 3 in the NE 1/4 of Sec. 10, T2S, R76W, Grand County, Colorado. Pool Creek.
Physiographic Position: Upland.
Topography: Steeply sloping mountain side facing west.
Drainage: Well drained.
Vegetation: Lodgepole pine.
Use: National Forest Service land.
Collected and Described by: John L. Retzer, July 24, 1952.

Horizon and Lincoln Lab. No.	
Ao - Aoo	1½ to 0 inch. An organic mat made up of partially decomposed and fresh needles, roots, bark and twigs.
A2 2773	0 to 5 inches. Grayish brown or light brownish gray (10YR 5.5/2 dry) to dark grayish brown or grayish brown (10YR 4.5/2 moist) gravelly sandy loam; soft when dry, very friable when moist; weak fine platy structure breaking to weak moderate fine granules; very strongly acid, approximate pH 4.7; lower boundary gradual and smooth.
B2 2774	5 to 16 inches. Brown (10YR 5/3 dry) to brown or dark brown (10YR 5/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure; strongly acid, approximate pH 5.2; lower boundary gradual and smooth.
B3 2775	16 to 24 inches. Light olive brown (2.5Y 5/4 dry) to olive brown (2.5Y 4/4 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; strongly acid, approximate pH 5.1; lower boundary diffuse and smooth.
C 2776	24 to 45 inches. Light olive brown (2.5Y 5/4 dry) to olive brown (2.5Y 4/4 moist) very gravelly sandy loam; slightly hard when dry, very friable when moist; massive; strongly acid, approximate pH 5.5; lower boundary diffuse and smooth.
D 2777	45 to 71 inches. Light olive brown (2.5Y 5/4 dry) to olive brown (2.5Y 4/4 moist) gravelly sandy loam; strongly to medium acid; approximate pH 5.6; this is partly weathered bedrock.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Bobtail gravelly sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2778-2781

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1		TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-5	A2	24.1	12.7	6.3	10.4	8.0	32.5	6.0	28.4	17.9		cosl
5-16	B2	29.5	13.2	5.9	12.0	8.7	25.2	5.5	27.7	13.0		cosl
16-43	C1	30.2	18.9	7.7	16.1	8.6	13.8	4.7	22.7	8.1		lcos
43-69	C2	25.9	15.6	6.5	14.2	9.2	19.9	8.7	26.1	10.6		lcos

8C1a 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N
4.9			1.72	.046	37
5.2			0.33	.021	16
5.8			0.18	.009	
6.0			0.15		

5A1a CATION EXCHANGE	EXTRACTABLE CATIONS 6N2b	6O2b	6H1a	6P2a	5B1a 6Q2a	BASE SAT. NH4OAc	5C3 Base Sat. %	5B1a Sum	5A3a Sum		8D3 Ca/Mg

Soil Type: Bobtail gravelly sandy loam
Location: NW 1/4 of Sec. 10, T2S, R76W, Grand County, Colorado. Fool Creek.
Physiographic Position: Upland.
Topography: Steeply sloping mountain side facing west.
Drainage: Well drained.
Vegetation: Lodgepole pine.
Use: National Forest Service land.
Collected and Described by: John L. Retzer, July 31, 1952.

Horizon and Lincoln Lab. No.	
Ao - Aoo	1 to 0 inch. An organic mat made up of undecomposed and partially decomposed needles, bark, twigs, and roots.
A2 2778	0 to 5 inches. Light brownish gray (10YR 6/2 dry) to grayish brown (10YR 5/2 moist) gravelly sandy loam; soft when dry, very friable when moist; very weak medium platy structure breaking to weak to moderate fine granules; very strongly acid, approximate pH 4.6; lower boundary gradual and smooth.
B2 2779	5 to 16 inches. Brown (10YR 5.5/3 dry and 10YR 4.5/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure; very strongly acid, approximate pH 4.9; lower boundary gradual and smooth.
C1 2780	16 to 43 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; strongly acid, approximate pH 5.1; lower boundary gradual and smooth.
C2 2781	43 to 69 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; strongly acid, approximate pH 5.5. This profile had a water table at 69 inches.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Bobtail gravelly sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2782-2786

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-6	A2	10.6	8.3	5.0	12.3	13.3	42.0	8.5	40.6	22.3		l
6-16	B2	10.5	9.4	6.7	15.8	15.0	36.0	6.6	42.1	18.6		fsl
16-27	B3	13.7	12.2	8.3	18.6	15.0	26.9	5.3	37.7	15.7		cosl
27-35	C1	6.1	11.4	10.0	23.0	15.7	27.6	6.2	40.6	16.6		fsl
35-59	D	13.6	16.0	8.3	15.3	11.2	30.2	5.4	30.9	19.4		cosl

8C1a pH 1:1	pH 1:5	pH 1:10	6A1a ORGANIC MATTER ORGANIC CARBON %	6B1a NITROGEN %	C/N
4.7			1.25	.042	30
5.2			0.38	.025	15
5.5			0.22	.019	
5.9			0.12		
6.5			0.09		

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg
←	milliequivalents per 100g. soil				→			me/100g	me/100g	
15.0	3.3	0.7	7.4	0.1	0.4	30	38	4.5	11.9	
12.7	3.5	0.8	5.5	0.1	0.4	38	47	4.9	10.4	

Soil Type: Bobtail gravelly sandy loam
Location: NW 1/4 of Sec. 10, T2S, R76W, Grand County, Colorado. Pool Creek.
Physiographic Position: Upland.
Topography: Steeply sloping mountain side facing east.
Drainage: Well drained.
Vegetation: Lodgepole pine.
Use: National Forest Service land.
Collected and Described by: John L. Retzer, July 21, 1952.

Horizon and
Lincoln
Lab. No.

Ao - Aoo — 1½ to 0 inch. An organic mat made up of undecomposed and partially decomposed forest refuse mainly needles, bark, twigs.

A2
2782 — 0 to 6 inches. Light brownish gray (10YR 6/2 dry) to grayish brown (10YR 5/2 moist) gravelly loam; soft when dry, very friable when moist; weak medium platy structure; very strongly acid, approximate pH 4.7; lower boundary gradual and smooth.

B2 — 6 to 16 inches. Brown (10YR 5.5/3 dry and 10YR 4.5/3 moist) gravelly sandy loam; slightly hard when

[redacted]

pH 5.2; lower boundary gradual and smooth.

B3
2784 — 16 to 27 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) gravelly sandy loam; loose when dry or moist; massive; medium acid, approximate pH 5.6; lower boundary clear and smooth.

C1
2785 — 27 to 35 inches. Light yellowish brown (2.5Y 6/4 dry) to light olive brown (2.5Y 5/4 moist) gravelly sandy loam; very hard when dry, very firm when moist; massive; medium acid, approximate pH 5.8; this is a horizon of partially weathered bedrock.

D
2786 — 35 to 59 inches. Light yellowish brown (2.5Y 6/4 dry) to light olive brown (2.5Y 5/4 moist) very weakly weathered gneiss and schist bedrock.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Bobtail gravelly sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2787-2790

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	> 2	TEXTURAL CLASS
0-5	A2	10.0	7.9	6.6	13.6	11.9	42.0	8.0	37.1	24.5		l
5-18	B2	12.0	11.3	7.3	16.2	14.9	34.5	3.8	39.4	19.8		fsl
18-26	C1	9.6	12.3	8.9	20.6	16.0	30.2	2.4	41.0	17.2		fsl
26-58	Dr	13.4	15.4	10.7	23.8	14.1	20.6	2.0	36.5	11.6		lcos

8C1a pH 1:1	1:5	1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N
4.7			1.04	.038	27
5.0			0.26	.014	18
5.1			0.15	.008	
5.4			0.12		

5A1a EXTRACTABLE CATIONS				5B1a	BASE SAT. %	Base Sat. %	5B1a Sum	5A3a Sum		Ca/Mg
CATION										

Soil Type: Bobtail gravelly sandy loam
Location: NW 1/4 of Sec. 10, T2S, R76W, Grand County, Colorado. Pool Creek.
Physiographic Position: Upland.
Topography: Steeply sloping mountain side, facing east.
Drainage: Well drained.
Vegetation: Lodgepole pine.
Use: National Forest Service land.
Collected and Described by: John L. Retzer, July 21, 1952.

Horizon and Lincoln Lab. No.	
Ao - Aoo	2 to 0 inch. An organic mat made up of pine needles, bark and roots.
A2 2787	0 to 5 inches. Grayish brown or light brownish gray (10YR 5.5/2 dry) to dark grayish brown or grayish brown (10YR 4.5/2 moist) gravelly loam; soft when dry, very friable when moist; weak fine platy breaking to moderate fine granular structure; very strongly acid, approximate pH 4.9; lower boundary gradual and smooth.
B2 2788	5 to 18 inches. Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; strongly acid, approximate pH 5.2; lower boundary gradual and smooth.
C1 2789	18 to 26 inches. Light yellowish brown (2.5Y 6/4 dry) to light olive brown (2.5Y 5/4 moist) gravelly sandy loam; very hard when dry, very firm when moist; massive; strongly acid, approximate pH 5.1; this horizon is the upper part of the bedrock and is mainly weathered rock; lower boundary diffuse and smooth.
Dr 2790	26 to 58 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/4 moist) fractured bedrock with gravelly sandy loam in the fractures.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Bottle gravelly sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2761-2763

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	3A1 > 2	TEXTURAL CLASS
2-0	Ao											
0-7	A2	5.2	4.8	9.2	28.9	18.4	30.5	3.0	51.7	14.6		fsl
7-28	B2	5.4	5.5	14.6	33.1	14.4	23.2	3.8	41.2	9.5		fsl

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N
4.8			0.87	.027	32
5.1			0.36	.019	19

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	Base Sat. % on Sum Cations 5C3	5B1a Sum Bases	5A3a Sum Cations	Ca/Mg
← milliequivalents per 100g. soil →								me/100g	me/100g	
52.1	21.9	0.1		0.3	2.8	48		25.1		
4.9	1.4	0.1	3.0	0.1	0.2	37	38	1.8	4.8	
3.4	0.9	0.1	2.4	0.1	0.1	35	33	1.2	3.6	

Soil Type: Bottle gravelly sandy loam
Location: SW 1/4 of Sec. 3, T2S, R76W, Grand County, Colorado. Pool Creek Watershed.
Physiographic Position: Upland.
Topography: Steeply sloping mountain side facing north.
Drainage: Well drained.
Vegetation: Lodgepole pine.
Use: National Forest Service lands.
Collected and Described by: John L. Retzer, September 2, 1949.

Horizon and Lincoln Lab. No.	
Aoo	4 to 2 inches. Mat of undecomposed pine needles, twigs, bark, roots and branches.
Ao 2761	2 to 0 inch. Very dark gray (10YR 3/1 dry) to black (10YR 2/1 moist) fibrous mat of partially decayed organic matter mixed with a small amount of mineral soil; very strongly acid, approximate pH 4.8.
A2 2762	0 to 7 inches. White (10YR 8/1 dry) to light gray (10YR 6/1 moist) gravelly sandy loam; soft when dry, very friable when moist; moderate fine platy structure; extremely acid, approximate pH 4.4; lower boundary clear and smooth.
B2 2763	7 to 28 inches. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; weak fine subangular blocky structure breaking to weak coarse granules; very strongly acid, approximate pH 4.6. This horizon grades downward into only weakly weathered Dakota sandstone.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Bottle gravelly sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2764-2767

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	> 2	TEXTURAL CLASS
2-0	Ao-Aoo											
0-3	A2	13.2	10.2	8.0	18.2	8.0	32.9	9.5	35.9	15.6		sl
3-13	B2	9.8	8.8	10.2	25.8	8.5	28.0	8.9	36.3	15.1		fsl
13-19	B3	10.7	11.6	12.2	27.1	7.8	17.6	13.0	31.1	9.4		sl

	pH		ORGANIC MATTER		
8C1a 1:1	1:5	1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N
4.6			3.56	.113	32
4.9			1.02	.046	22
4.9			1.35	.048	28

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH.	Base Sat. % ou Sum Cations	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg
←	milliequivalents per 100g. soil				→	5C1	5C3	me/100g	me/100g	
10.1	5.8	1.4	1.4.0	0.2	0.3	40	24	7.7	22.6	4.1

[redacted]

Soil Type: Bottle gravelly sandy loam
Location: SW 1/4 of Sec. 3, T2S, R76W, Grand County, Colorado. West St. Louis Watershed.
Physiographic Position: Upland.
Topography: Steeply sloping mountain side facing north.
Drainage: Well drained.
Vegetation: Spruce and fir.
Use: National Forest Service lands.
Collected and Described by: John L. Retzer, August 31, 1959.

Horizon and Lincoln Lab. No.	
Ao - Aoo 2764	2 to 0 inch. A forest litter made up of undecomposed and partially decomposed forest refuse, principally needles, twigs and roots.
A2 2765	0 to 3 inches. Light gray (10YR 7/2 dry) to light brownish gray (10YR 6/2 moist) gravelly sandy loam; soft when dry, very friable when moist; moderate fine platy structure; very strongly acid, approximate pH 4.6; lower boundary clear and smooth.
B2 2766	3 to 13 inches. Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; weak fine subangular blocky structure; very strongly acid, approximate pH 4.6; lower boundary clear and smooth. Approximately 20 percent of this horizon is stone.
B3 2767	13 to 19 inches. Light yellowish brown (10YR 6/4 dry) to dark yellowish brown (10YR 4/4 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; very strongly acid, approximate pH 4.9; approximately 20 percent of this horizon is stone, and the horizon grades downward into only

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Bottle gravelly sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2768-2772

DEPTH		1Ela. PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) 3A1										TEXTURAL
		VERY				VERY						

Soil Type: Bottle gravelly sandy loam
Location: SW 1/4 of Sec. 3, T2S, R76W, Grand County, Colorado. West St. Louis Creek Watershed.
Physiographic Position: Upland.
Topography: Steeply sloping mountain side facing north.
Drainage: Well drained.
Vegetation: Spruce and fir.
Use: National Forest Service land.
Collected and Described by: John L. Retzer, August 31, 1949.

Horizon and Lincoln Lab. No.	
Aoo	4 to 2 inches. Undecomposed forest litter made up of needles, twigs, roots, and bark.
Ao 2768	2 to 0 inch. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) fibrous orgaine mat made up of partially weathered forest debris mixed with a small amount of mineral matter. Very strongly acid, approximate pH 4.9.
A2 2769	0 to 6 inches. Light gray (10YR 7/1 dry) to gray or light gray (10YR 6/1 moist) gravelly loam; soft when dry, very friable when moist; moderate fine platy structure; very strongly acid, approximate pH 4.5; approximately 5 percent of this horizon is rock; lower boundary clear and smooth.
B2 2770	6 to 24 inches. Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; weak to moderate medium subangular blocky structure; very strongly acid, approximate pH 4.6; approximately 30 percent of this horizon is rock; lower boundary gradual and smooth.
B3 2771	24 to 34 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; very strongly acid, approximate pH 4.8; approximately 40 percent of this horizon is rock; lower boundary gradual and smooth.
C 2772	34 to 48 inches. Light brownish-gray (10YR 6/2 dry) to grayish brown (10YR 5/2 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; strongly acid, approximate pH 5.2; approximately 50 percent of this horizon is rock and the horizon grades downward into unweathered sandstone bedrock.

SOIL SURVEY LABORATORY Lincoln, Nebr. 3/17/58

SOIL TYPE Bottle fine sand **LOCATION** Grand County, Colorado

SOIL NOS. S55Colo-25-2 **LAB. NOS.** 2873-2876

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-.002	2A2 > 2 (<19 mm.)	TEXTURAL CLASS
1½-0	Ao											
0-6	A2	1.1	4.3	13.7	42.8	9.3	25.1	3.7	43.1	12.8	6	fsl
6-11	B2ir	2.4	4.4	10.1	54.8	11.8	12.7	3.8	50.7	6.6	13	lfs
11-33	C	3.1	3.6	10.1	67.7	9.1	4.6	1.8	51.0	2.4	16	fs

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6C1a Free Iron Fe_2O_3 %	MOISTURE TENSIONS 4B1a 1/10 ATMOS. %	4B1a 1/3 ATMOS. %	4B2 15 ATMOS. %
4.8			0.97	.029	33	0.4	14.8	9.4	2.5
4.8			0.25	.010	25	0.5	8.6	5.0	1.4
4.9			0.23	.007		0.3	5.0	2.6	1.0

Soil Type: Bottle fine sand
Soil Nos.: 855Colo-25-2
Location: Approximately the SE quarter of the SW quarter of Sec. 3, T2S; R76W; Grand County, Colorado.
Physiographic Position: Steeply sloping mountain side.
Topography: Strongly sloping convex side hill of approximately 35 percent gradient facing north.
Drainage: Well drained.
Vegetation: Lodgepole pine and weak undercover of brush and sedge.
Collected by: James Allen, A. Aandahl, J. Retzer, E. M. Payne, A. J. Cline, and H. Bindschadler, October 9, 1955.

Horizon and Lincoln Lab. No.	
Aoo	2 to 1½ inches. Undecomposed needle mat.
Ao 2873	1½ to 0 inch. Very dark gray to very dark grayish brown (10YR 3/1.5 dry) to black or very dark brown (10YR 2/1.5 moist) partially decomposed organic material ranging in thickness from 3 to 6 inches; lower boundary clear and smooth.
A2 2874	0 to 6 inches. Light gray (10YR 7/1.5 dry) to light gray or light brownish gray (10YR 6/1.5 moist) fine sands; soft when dry, very friable when moist; weak very coarse platy structure breaking to weak to moderate fine and medium crumb structure; strongly acid; lower boundary abrupt and wavy.
B2ir 2875	6 to 11 inches. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) loamy fine sand; soft when dry, very friable when moist; weak fine and medium subangular blocky structure breaking to weak, medium or coarse granules; the horizon contains many medium-sized distinct 7.5YR 4/4 mottles; the horizon ranges in thickness from 5 to 8 inches; lower boundary clear and wavy.
C1 2876	11 to 33 inches. Very pale brown (10YR 7/3 dry) to pale brown (10YR 6/3 moist) partially weathered sandstone base rock; about 85 percent of the entire mass is made up of unweathered rock fragments.

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Bresser sandy loam SOIL Nos. S61Colo-3-9 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 15550-15556 February 1965

Depth (In.)	Horizon	1B1a Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	Clay: Carbonate	Clay: Noncarbonate	Coarse fragments 2A2: >= 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-6	A1	70.9	21.4	7.7	9.0	26.6	14.0	15.7	5.6	16.1	5.3	28.0	65.3			Tr.		
6-10	B1	70.8	14.4	14.8	7.4	20.2	14.8	22.0	6.4	9.8	4.6	25.7	64.4			Tr.		
10-18	B2t	65.4	14.8	19.8	6.1	19.7	13.9	19.9	5.8	9.1	5.7	23.1	59.6			Tr.		
18-29	B3	75.8	11.0	13.2	4.0	16.7	16.9	29.9	8.3	7.6	3.4	28.7	67.5			Tr.		
29-40	C1	88.8	4.1	7.1	7.5	32.8	21.5	21.6	5.4	2.5	1.6	15.9	83.4			Tr.		
40-52	C2	89.7	3.5	6.8	8.3	32.3	20.4	24.2	4.5	2.1	1.4	16.0	85.2			Tr.		
52-62	C3	90.0	3.7	6.3	8.7	28.3	22.3	25.9	4.8	2.1	1.6	16.9	85.2			Tr.		

Depth (In.)	6A1a Organic carbon [a]	6B1a Nitrogen	C/N		6E1c Carbonate as $CaCO_3$	6C1a Ext. Iron as Fe	Bulk density: 4A1c 30-Cm.	Bulk density: 4A1b Air-Dry	4m COLE [b]	Water content: 4B3 30-Cm.	Water content: 1/3-Bar	Water content: 4B2 15-Bar			pH: 1:10	pH: 8C1a (1:1)
	Pct.	Pct.			Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct.	Pct.				
0-6	1.01	0.073	14			0.4			1.62			3.5			6.7	6.3
6-10	0.62	0.066	9			0.5		1.50	1.58	0.07	14.4	6.0			6.7	6.4
10-18	0.50	0.048	10		-	0.6		1.57	1.69	0.19	15.4	8.1			7.0	6.8
18-29	0.20	0.026			-	0.4						4.8			7.1	7.1
29-40	0.05				-	0.2		1.70	1.78	0.15	11.2	2.5			7.1	7.1
40-52	0.03				-	0.3			1.72			3.0			7.2	7.2
52-62	0.01				-	0.3						2.8			7.4	7.5

Depth (In.)	Extractable bases 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	5B1a Sum	6H1a Ext. Acidity	Cat. Exch. Cap. 5A3a Sum Cations	Cat. Exch. Cap. 5A1a NH_4OAc	8D3 Ca/Mg	Base saturation 5C3 Sum Cations	Base saturation 5C1 NH_4OAc
	meq/100 g									Pct.	Pct.
0-6	3.6	1.1	Tr.	0.6	5.3	2.5	7.8	6.3	3.3	68	84
6-10	6.5	2.0	Tr.	0.5	9.0	2.3	11.3	9.4	3.2	80	96
10-18	9.6	3.2	Tr.	0.5	13.3	2.3	15.6	13.3	3.0	85	100
18-29	5.5	2.0	Tr.	0.2	7.7	0.7	8.4	7.7	2.8	92	100
29-40	3.8	1.2	Tr.	0.2	5.2	0.5	5.7	5.2	3.2	91	100
40-52	4.1	1.2	Tr.	0.2	5.5	0.2	5.7	5.4	3.4	96	102
52-62	3.3	1.0	Tr.	0.1	4.4	0.5	4.9	4.5	3.3	90	98

Depth (In.)	Ratios to Clay 8D1 NH_4OAc CEC	Ratios to Clay 8D1 Ext. Iron	Ratios to Clay 8D1 15-Bar Water
0-6	0.82	0.05	0.45
6-10	0.64	0.03	0.40
10-18	0.67	0.03	0.41
18-29	0.58	0.03	0.36
29-40	0.73	0.03	0.35
40-52	0.79	0.04	0.44
52-62	0.71	0.05	0.44

a. 5.9 kg/m^2 to 40 inches.
b. Coefficient of linear extensibility.

Soil Type: Bresser sandy loam
Soil Nos.: S61Colo-3-9
Classification: Brown.
Location: 1,321 feet north, 44 feet west of the south quarter corner of Sec. 23, T4S, R61W, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation 14 inches. Mean annual temperature 49° F. Growing season 150 days. Elevation 5,250 feet.
Vegetation: Native pasture. Blue grama, green needlegrass, threeawn, little buckwheat, some sixweeks fescue.
Parent Material: Aeolian sands from the Dawson Arkose formation primarily.
Physiographic position: Upland.
Relief: Gently rolling. 8 percent north-facing slope. This pit is about 75 feet below the crest of an aeolian ridge, and about 200 feet up from the base. The ridge crest is about 30 feet higher than the trough and extends from northwest to southeast.

Drainage: Surface runoff rapid, internal drainage medium to rapid. Intake rate moderately rapid under grass, moderate where cultivated.
Moisture: Slightly moist throughout, usually dry.
Water table: None. Stoniness: None.
Erosion: None to slight wind.
Described by: J. B. Brown, June 29, 1961.

Horizon and Lincoln Lab. No.	
A1 15550	0 to 6 inches. Very dark grayish brown (10YR 3/2, moist) sandy loam; dark grayish brown (10YR 4/2, dry) very weak medium subangular blocks to weak medium granules; slightly hard when dry, loose when moist; many roots; clear smooth boundary.
B1 15551	6 to 10 inches. Dark brown (10YR 3.5/3, moist and crushed) sandy loam; dark brown (10YR 4/3, dry) weak medium prisms breaking to weak medium subangular blocks; hard when dry, very friable when moist; thin patchy clay films on some ped surfaces; many roots; clear wavy boundary.
B2t 15552	10 to 18 inches. Dark brown (7.5YR 4/3, moist) sandy clay loam; brown (7.5YR 4.5/3, dry) moderate medium prisms breaking to moderate medium angular blocks; very hard when dry, friable when moist; thin nearly continuous clay skins on ped surfaces; some clay nodules or spots where there is a definite increase in clay, are present; many roots penetrating soil aggregates; clear wavy boundary.
B3 15553	18 to 29 inches. Brown 7.5YR 4.5/3, moist) sandy loam; brown (7.5YR 5.5/3, dry) weak coarse prismatic breaking to weak coarse subangular blocks; very hard when dry, very friable when moist; thin patchy clay films on ped surfaces; clay nodules 5 to 15 millimeters in diameter are present; roots and root channels are plentiful; tongues of B2 horizon reach to 24 inches; clear wavy boundary.
C1 15554	29 to 40 inches. Brown (10YR 5/3, moist) loamy sand; pale brown (10YR 6/3, dry) massive; hard when dry, loose when moist; few clay balls at 5 to 15 millimeters in diameter are present; some roots and root channels; streaks of B3 reach to 40 inches, but no clay skins observed; some roots and root channels; clear smooth boundary.
C2 15555	40 to 52 inches. Brown (10YR 5/3, moist) sand; pale brown (10YR 6/3, dry) massive or single grain; slightly hard when dry, loose when moist; occasional clay ball 5 to 10 millimeters in diameter present; few roots and channels present; diffuse boundary.
C3 15556	52 to 62 inches. Brown (10YR 5/3, moist) sand; pale brown (10YR 6/3, dry) massive to single grain; slightly hard when dry, loose when moist; very few clay balls.

Remarks: This soil is noncalcareous throughout. At this location lime was found in horizontal streaks at 48 to 68 inches in a distance of 3 feet; lime streaks were violently calcareous, but only slightly calcareous below the streaks; lime depth is highly variable in this series in Arapahoe County. Many of the sand grains throughout the profile are feldspar.

Bureau of Public Roads Samples:

A1	0-6 inches
B2	10-18 inches
C1	29-40 inches

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Bresser sandy loam SOIL Nos. S61Colo-3-10 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 15557-15562 February 1965

Depth (In.)	Horizon	1B1a Size class and particle diameter (mm) 3A1 Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: Very coarse (2–1)	Coarse (1–0.5)	Medium (0.5–0.25)	Fine (0.25–0.1)	Very fine (0.1–0.05)	Silt: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	Coarse fragments 2A2: > 2 Pct.	2 – 19 Pct. of < 76mm	19 – 76 Pct. of < 76mm
		Pct. of < 2 mm														
0-5	A1	74.8	17.9	7.3	8.0	28.9	16.9	16.0	5.0	12.0	5.9	22.7	69.8	-		
5-9	B1	73.4	12.7	13.9	5.6	25.3	17.7	19.8	5.0	8.1	4.6	20.4	68.4	-		
9-16	B2t	69.3	12.0	18.7	9.2	31.2	14.0	11.5	3.4	7.7	4.3	14.9	65.9	-		
16-28	B3	83.9	6.1	10.0	10.8	36.6	18.3	15.7	2.5	3.6	2.5	8.6	81.4	-		
28-40	C1	86.8	5.0	8.2	12.5	31.3	18.0	20.6	4.4	3.0	2.0	15.4	82.4	Tr.		
40-50	C2	86.8	5.4	7.8	9.6	31.2	19.2	21.5	5.3	2.6	2.8	16.5	81.5	Tr.		

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N	6E1c Carbonate as $CaCO_3$ Pct.	Ext. Iron as Fe Pct.	Bulk density: 4A1g 1/10-Bar g/cc	4A1c 30-Cm. g/cc	4A1b Air-Dry g/cc	4D1 COLE d	Water content: 4B3 30-Cm. Pct.	4B1b 1/3 Bar b Pct.	4B2 15-Bar Pct.	pH 8C1a: 1:10	(1:1)
0-5	0.86	0.073	12			1.60		1.63	0.04	7.4a		3.4	6.2	6.2
5-9	0.75	0.077	10					1.62			9.6	5.4	6.6	6.3
9-16	0.66	0.060	11	-			1.58	1.71	0.19	16.2	14.3	7.9	6.8	6.6
16-28	0.21	0.020		-				1.75c			7.4	4.1	6.9	6.6
28-40	0.05			-							5.6	3.1	6.9	6.8
40-50	0.02			-								2.2	7.0	6.9

Depth (In.)	Extractable bases 5B1a: 6N2b Ca	6G2b Mg	6P2a Na	6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap.: 5A3a Sum Cations	5A1a NH_4OAc	8D3 Ca/Mg	Base saturation: 5C3 Sum Cations	5C1 NH_4OAc
	meq/100 g									Pct.	Pct.
0-5	3.8	1.0	Tr.	0.5	5.3	2.3	7.6	6.4	3.8	70	83
5-9	5.9	1.6	Tr.	0.4	7.9	2.3	10.2	8.8	3.7	77	90
9-16	9.3	2.8	Tr.	0.5	12.6	2.1	14.7	13.8	3.3	86	91
16-28	5.3	1.7	Tr.	0.3	7.3	1.4	8.7	7.5	3.1	84	97

Soil Type: Bresser sandy loam
Soil Nos.: S61Colo-3-10
Classification: Brown
Location: 612 feet west, 108 feet south of the northeast corner of Sec. 21, T5S, R61W, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation 15 inches. Mean annual temperature 48° F. Growing season 145 days, (estimated). Elevation 5,400 feet.
Vegetation: Native pasture. Blue grama, needleandthread, western wheatgrass, threeawn, little buckwheat, wild alfalfa.
Parent material: Aeolian sands from the Dawson Arkose formation primarily.
Physiographic position: Upland.
Relief: Gently rolling. 7 percent east-facing slope. This pit is about 30 feet below the crest of an aeolian ridge and about 150 feet up from the base. The ridge crest is about 20 feet higher than the trough and extends from north to south.
Drainage: Surface runoff rapid, internal drainage medium to rapid, intake rate moderately rapid under grass, moderate under cultivation.
Moisture: Slightly moist throughout, usually dry.
Water table: None. Stoniness: None.
Erosion: None to slight wind. Probably more deposition than removal.
Described by: J. B. Brown, June 30, 1961.

Horizon and Lincoln Lab No.	
A1 15557	0 to 5 inches. Very dark grayish brown (10YR 3/2, moist) light sandy loam; dark grayish brown (10YR 4.5/2, dry) very weak medium blocks breaking to weak fine granules; slightly hard when dry, loose when moist; many roots; field pH 6.6; clear smooth boundary.
B1 15558	5 to 9 inches. Dark brown (10YR 3/3, moist) sandy loam; dark brown (10YR 4/3, dry) weak medium prisms breaking to weak medium subangular blocks; hard when dry, very friable when moist; thin very patchy clay films on some peds; field pH 6.8; clear wavy boundary.
B2t	9 to 16 inches. Dark brown (7.5YR 3.5/3, moist) sandy clay loam; brown (7.5YR 4/3, dry) brown (7.5YR

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Buena Vista very stony sandy loam **LOCATION** Chaffee County, Colorado

SOIL NOS. 858Colo-8-7 **LAB. NOS.** 9075-9077

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-2	A1	8.1	13.8	8.1	13.1	12.1	31.8	13.0	35.6	15.0	Tr.	sl
2-5	AB	10.2	13.3	7.2	10.8	10.0	32.2	16.3	30.8	16.9	16	l
5-30	B2t	6.7	11.4	7.5	13.4	14.0	25.0	22.0	35.0	11.2	17	scl

DEPTH INCHES	8C1a pH 1:1	pH 1:5	pH 1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron Fe_2O_3 % 6C1a	6E1a $CaCO_3$ equivalent %	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
0-2	6.1			1.90	0.156	12	1.6				8.2
2-5	6.6			1.81	0.172	10	1.6	<1			9.1
5-30	7.6			1.07	0.094	11	1.6	<1			10.9

DEPTH INCHES	5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	Sum Bases 5E1a	Sum Cations 5A3a	Ca/Mg 8B3
	←	milliequivalents per 100g. soil				→			← me/100g →		
0-2	12.5	7.6	1.7	4.8	<0.1	0.9	82	68	10.2	15.0	4.5
2-5	15.2	11.2	2.5	3.2	<0.1	0.9	96	82	14.6	17.8	4.5
5-30	18.5	16.0	3.8	1.6	0.1	1.4	115	93	21.3	22.9	4.2

Soil Type: Buena Vista very stony sandy loam. Described by: A. J. Cline
Location: SE¼ of Sec. 2, T15S, R77W, Chaffee County, Colorado.
Date of Sampling: September 1957
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline
Physiographic Position: Upland side slope at an elevation of approximately 9,775 feet.
Topography: Moderately sloping convex area facing southwest.
Drainage: Well Drained. Vegetation: Ring muhly, fescue, and sage.
Use: National Forest Service land.
Soil Nos.: S58Colo-8-7

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Buena Vista very stony sandy loam LOCATION Chaffee County, Colorado

SOIL NOS. 858Colo-8-10 LAB. NOS. 9086-9090

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-3	A1	22.6	18.5	9.0	11.7	9.2	20.0	9.0	26.9	8.7	7	cosl
3-10	AB	20.5	15.4	8.0	10.6	8.7	22.2	14.6	26.7	10.2	19	cosl
10-16	B2	20.0	16.7	7.5	9.5	9.3	21.5	15.5	25.7	10.6	27	cosl
16-20	B3ca	18.1	17.9	7.2	11.0	9.0	24.1	12.7	26.0	12.9	22	cosl
20-35+	Cca	8.5	16.3	10.1	15.8	10.6	24.3	14.4	28.4	14.3	35	sl

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron $\%Fe_2O_3$ 6C1a %		6E1a $CaCO_3$ equivalent %		MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.1			1.83	0.124	15	1.1						6.6

Soil Type: Buena Vistavery stony sandy loam. Described by: A. J. Cline
Location: NW¼ of Sec. 26, T14S, R77W, Chaffee County, Colorado.
Date of Sampling: September 1957
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline
Physiographic Position: Upland ridge at an elevation of approximately 9,300 feet.
Topography: A moderate convex slope of approximately 7 percent facing east.
Drainage: Well drained.
Vegetation: Ring Muhly, blue grama, sage, and scattered weeds.
Use: National Forest Service land.
Soil Nos.: 58Colo-8-10

Lincoln Lab. No.	Horizon		
9086	A_1	0-3 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) stony sandy loam; soft when dry, very friable when moist; strong very fine granular structure; noncalcareous; approximately 20 percent of this horizon is small stone and gravel; lower boundary clear and smooth.
9087	AB	3-10 inches	Brown (10YR 5/3 dry) to dark brown (10YR 3/3 moist) stony sandy loam; slightly hard when dry, very friable when moist; weak to moderate medium subangular blocky structure breaking to moderate medium granules; noncalcareous; approximately 50 percent of this horizon is stone; lower boundary clear and smooth.
9088	B_{2t}	10-16 inches	Brown or pale brown (10YR 5.5/3 dry) to dark brown (10YR 3.5/3 moist) stony sandy clay loam; slightly hard when dry, very friable when moist; moderate fine subangular blocky structure; noncalcareous; there are thin patchy clay skins on both the horizontal and vertical faces of most of the soil aggregates, and there is a thin nearly continuous coating of clay on the rock fragments; approximately 50 percent of this horizon is stone; lower boundary gradual and smooth.
9089	B_{3ca}	16-20 inches	Pale brown (10YR 6/3 dry) to brown or dark brown (10YR 4/3 moist) stony sandy loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure; violently effervescent; this is a weak horizon of lime accumulation with some visible lime occurring as concretions; approximately 50 percent of this horizon is rock and there is some lime coating on their surfaces; lower boundary gradual and smooth.
9090	C_{ca}	20-35+ inches	Light gray (2.5Y 7/1 dry) to gray or grayish brown (2.5Y 5/1.5 moist) stony sandy loam; slightly hard when dry, very friable when moist; massive; violently effervescent; this is a prominent horizon of lime accumulation with visible lime occurring in finely divided forms and as small concretions; approximately 70 percent of this horizon is stone and the surfaces of most of the stones are coated with lime. This horizon grades downward into only slightly fractured trachyte rocks.

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Buick loam SOIL Nos. S61Colo-3-5 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 15517-15524 February 1965

Depth (In.)	Horizon	1B1a Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Size class and particle diameter (mm) Sand: Very coarse (2–1)	Coarse (1–0.5)	Medium (0.5–0.25)	Fine (0.25–0.1)	Very fine (0.1–0.05)	Silt (0.05–0.02)	Int. III (0.02–0.002)	Int. II (0.2–0.02)	3A1 (2–0.1)	3A1a Clay: Carbonate	Noncarbonate	Coarse fragments 2A2: > 2	2 - 19	19 - 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-3	A1	31.3	53.0	15.7	1.8	1.1	1.2	6.7	20.5	38.2	14.8	63.0	10.8		16	Tr.		
3-6	B1	30.9	43.1	26.0	2.1	1.1	1.2	7.3	19.2	31.2	11.9	55.1	11.7		26	Tr.		
6-11	B2t	31.9	37.7	30.4	2.7	1.5	1.5	8.4	17.8	27.1	10.6	50.3	14.1	-	30	Tr.		
11-19	IIB21ca	25.6	31.2	43.2	1.6a	1.2a	1.5a	8.9a	12.4a	15.2	16.0	33.3	13.2	20	23	Tr.		
19-24	IIB22ca	23.5	34.1	42.4	1.2a	0.7a	1.1a	8.2a	12.3a	15.3	18.8	33.1	11.2	18	24	Tr.		
24-31	IIIB21ca	25.4	36.6	38.0	0.8a	0.8a	1.1a	8.5a	14.2a	18.0	18.6	37.9	11.2	14	24	Tr.		
31-49	IIIB22ca	31.5	36.0	32.5	2.1a	1.2a	1.5a	10.7a	16.0a	21.4	14.6	44.3	15.5	7	25	Tr.		
49-64	IIIB23ca	35.0	35.0	30.0	1.8a	1.5a	1.8a	12.6a	17.3a	21.3	13.7	46.8	17.7	3	27	Tr.		
11-19b	IIB21ca	36.0	32.4	31.6	2.6	1.4	1.9	12.6	17.5	20.3	12.1	45.8	18.5					
19-24b	IIB22ca	33.8	34.1	32.1	1.2	1.1	1.7	11.8	18.0	20.9	13.2	46.5	15.8					
31-49b	IIIB22ca	36.4	34.2	29.4	1.4	1.1	1.8	12.7	19.4	20.9	13.3	48.6	17.0					

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	6B1a C/N		6E1c Carbonate as $CaCO_3$	6C1a Ext. Iron as Fe	Bulk density 4A1c 30-Cm.	4A1b Air-Dry	4D1 COLE f	Water content 4B3 30-Cm.		4B2 15-Bar			pH 8C1a 1:10	(1:1)
	Pct.	Pct.			Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct.	Pct.			
0-3	1.41	0.103	14		-	0.8			1.44				6.8			7.2	6.9
3-6	1.08	0.109	10		-	0.9							10.2			7.1	6.8
6-11	0.98	0.097	10		Tr.	1.1		1.32c	1.49	0.21	21.4c		12.4			7.5	7.3
11-19	0.74	0.079	9		30	0.8							12.1			8.4	7.9
19-24	0.42	0.045	9		29	0.6			1.64				12.0			8.5	8.0
24-31	0.22				23	0.7			1.74				11.4			8.6	8.1
31-49	0.08				11	0.8		1.47	1.69	0.81	26.3		11.0			8.6	8.1
49-64	0.07				7	0.8							11.3			8.5	8.1

Depth (In.)	Extractable bases 5B1a 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap. 5A3a Sum Cations	5A1a NH_4OAc	8D3 Ca/Mg	Base saturation 5C3 Sum Cations	5C1 NH_4OAc
	meq/100 g									Pct.	Pct.
0-3	9.2	2.4	Tr.	0.8	12.4	2.8	15.2	12.0	3.8	82	103
3-6	14.5	3.7	Tr.	0.8	19.0	4.3	23.3	18.6	3.9	82	102
6-11			0.1	1.0				22.9			
11-19			0.1	0.6				17.6			
19-24			0.2	0.6				17.5			
24-31			0.3	0.5				18.3			
31-49			0.4	0.6				19.2			
49-64			0.5	0.6				19.1			

Depth (In.)	Ratios to Clay 8D1 d NH_4OAc CEC	e NH_4OAc CEC	e Ext. Iron	e 15-Bar Water
0-3	0.76	0.76	0.05	0.43
3-6	0.72	0.72	0.04	0.39
6-11	0.75	0.75	0.04	0.41
11-19	0.76	0.41	0.02	0.28
19-24	0.73	0.41	0.01	0.28
24-31	0.76	0.48	0.02	0.30
31-49	0.77	0.59	0.02	0.34
49-64	0.71	0.64	0.03	0.38

a. 5-25% carbonate.
b. Analysis after carbonate removal (See method 1B3).
c. One clod.
d. Noncarbonate clay.
e. Total clay.
f. Coefficient of linear extensibility.

Micromorphology (Method 4E1). B2 has a very few clay films around pores; none on planar surfaces. Much sparser than in Weld B2. No clay films observed in the II B21ca. Fabric of the II B21ca much denser than the B2. Apparently fine-grain carbonate (20 percent clay-size carbonate) has filled every nook and cranny. All sand grains have surrounding fines. Have the sand grains been pushed apart by carbonate? Have about 1.1g./cc. of noncarbonate material. (This value was calculated by subtracting from the interpolated bulk density of 1.57g./cc., the product of the bulk density and the weight fraction of carbonate--$1.57 \times \frac{30\%}{100}$.) The low weight per unit volume of noncalcareous material indicates that either the noncalcareous fabric has been pushed apart or the parent material was strongly calcareous.

Soil Type: *Buick loam
Soil Nos.: S61Colo-3-5
Classification: Brown.
Location: 2,100 feet east, 970 feet north of the southwest corner of Sec. 22, T5S, R59W, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation 14 inches. Mean annual temperature 49° F. Growing season 150 days. Elevation 5,400 feet.
Vegetation: Native pasture. Blue grama, buffalograss, pricklypear, some western wheatgrass, sixweeks fescue, and wild alfalfa.
Parent material: Outwash, probably quarternary age. Solum probably mixed local aeolian material and outwash.
Physiographic position: Upland.
Relief: Sloping. 8 percent facing south. Slope about 500 feet long, grades toward small drainage way and out by small subdrainage. Pit about 250 feet from crest of slope.
Drainage: Surface drainage rapid, internal drainage medium in buried soils but slower than in the loess soils. Moderate intake rate.
Moisture: Moist to 14 inches. Usually dry. Water table: None
Stoniness: Few fine water-worn gravel of quartz and feldspar on the surface and throughout the profile. Some increase with depth. Estimated 5 percent by volume.
Salt or alkali: None observed other than calcium carbonate. Erosion: Slight water and wind erosion.
Described by: J. B. Brown, June 28, 1961.

Horizon and Lincoln Lab. No.

A1 15517 — 0 to 3 inches. Very dark grayish brown (10YR 3.5/2, moist) loam; grayish brown (10YR 5/2, dry) weak medium subangular blocks breaking to weak fine granules; soft when dry, very friable when moist; few fine water-worn gravels; clear smooth boundary.

B1 15518 — 3 to 6 inches. Very dark grayish brown (10YR 3.5/2, moist and crushed) loam; dark grayish brown (10YR 4/2, dry) moderate medium prisms breaking to weak medium angular blocks; slightly hard when dry, very friable when moist; few thin patchy clay films on some vertical faces; few water-worn gravels; clear smooth boundary.

B2t 15519 — 6 to 11 inches. Dark brown (10YR 4/3, moist) clay loam; brown (10YR 4.5/3, dry) dark grayish brown (10YR 4/2, moist and crushed) moderate medium prisms breaking to moderate to strong fine angular blocks; slightly hard when dry, friable when moist; thin nearly continuous clay films on all ped surfaces; many roots and root channels penetrating peds; few water-worn pebbles, with definite stone line of fine gravel at the base; abrupt slightly wavy boundary.

II B21ca 15520 — 11 to 19 inches. Very pale brown (10YR 7/3, moist) heavy loam; very pale brown (10YR 7.5/3, dry) weak medium prismatic breaking to moderate fine subangular blocks; hard when dry, friable when moist; thin patchy clay skins on ped surfaces; roots are plentiful; few small water-worn pebbles; violent effervescence; clear smooth boundary.

II B22ca 15521 — 19 to 24 inches. Pale brown (10YR 6/3, moist) light clay loam; very pale brown (10YR 7/3, dry) weak medium prisms breaking to moderate fine subangular blocks; hard when dry, friable when moist; thin patchy clay films on all ped surfaces; roots and channels plentiful; few small water-worn pebbles present; violent effervescence; clear smooth boundary.

III B21ca 15522 — 24 to 31 inches. Light yellowish brown (10YR 6/4, moist) clay loam; very pale brown (10YR 7/3, dry) moderate coarse prismatic breaking to moderate medium subangular blocks; hard when dry, firm when moist; thin patchy clay films on ped surfaces, with dark streaks on outside of peds; some roots; more fine gravel in this horizon than the ones above; violent effervescence; gradual smooth boundary.

III B22ca 15523 — 31 to 49 inches. Yellowish brown (10YR 5/4, moist) clay loam; light yellowish brown (10YR 6/4, dry) moderate coarse prismatic; very hard when dry, firm when moist; thin nearly continuous clay films; dark stains on peds continue; lime concretions are common medium and distinct; few pebbles and more coarse sand; strongly calcareous between lime concretions; lime concretions violently effervescent; gradual smooth boundary.

III B23ca 15524 — 49 to 64 inches. Yellowish brown (10YR 5/4, moist) heavy loam; light yellowish brown (10YR 6/4, dry) weak to moderate coarse prismatic; hard when dry, friable when moist; thin patchy clay skins on vertical faces; many small holes less than one millimeter in diameter; lime concretions are few medium and distinct; strong to violent effervescence.

Remarks: This soil is found on the side slopes beneath the Aeolian loess caps, and above residual soils on shale at the foot of slopes. The buried soils are quite distinctive; although it is hard to distinguish a difference between them and the modern soil. Dark staining of ped surfaces and clay films are the distinguishing characteristics. The stone line, as found in this profile, is not normally seen. This is the type location of the Buick series.

Bureau of Public Roads Samples: A1, 0-3 inches; B2, 6-11 inches; III B22ca, 31-49 inches.

SELECTED PARTICLE-SIZE DATA

LSL No.	Horizon	Total Sand %	Percent of Total Sand: Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Ratio Coarse Over Fine Silt
15517	A1	31.3	5.8	3.5	3.8	21.4	65.5	2.6
15518	B1	30.9	6.8	3.6	3.9	23.6	62.1	2.6
15519	B2t	31.9	8.5	4.7	4.7	26.3	55.8	2.6
15520	II B21ca	36.0*	7.2*	3.9*	5.3*	35.0*	48.6*	1.7*
15521	II B22ca	33.8*	3.6*	3.2*	5.0*	34.9*	53.3*	1.6*
15522	III B21ca							
15523	III B22ca	36.4*	3.8*	3.0*	4.9*	34.9*	53.4*	1.6*
15524	III B23ca							

*Carbonate removed with pH-5 NaOAc buffer.

Observations of fabric with stereoscopic microscope: B2 may have a very few clay films. Peds appear denser and shinier than 3-8.

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Buick loam SOIL Nos. S62Colo-3-6 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 16991-16998 February 1965

Depth (in.)	Horizon	1B1b Size class and particle diameter (mm) 3A1 Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Clay: Carbonate	3A1a Clay: Noncarbonate	Coarse fragments 2A2: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-4	A1	32.8	51.2	16.0	0.1a	0.5a	0.7a	3.6	27.9	38.7	12.5	69.0	4.9		16	Tr.		
4-7	B1	34.0	40.8	25.2	0.1a	0.3a	0.7a	3.7	29.2	29.5	11.3	61.2	4.8		25	Tr.		
7-15	B2	27.8	43.5	28.7	0.2a	0.3a	0.6a	3.0	23.7	29.7	13.8	55.4	4.1		29	Tr.		
15-25	B31ca	16.2	54.4	29.4	0.1b	0.1b	0.3c	1.3c	14.4c	32.9	21.5	48.2	1.8	3	26	Tr.		
25-36	B32ca	14.8	56.8	28.4	-	0.1b	0.3c	1.2c	13.2c	34.4	22.4	48.4	1.6	3	25	Tr.		
36-43	IIB21ca	16.4	55.2	28.4	-	0.2c	0.6c	2.0c	13.6c	32.9	22.3	47.7	2.8	2	26	Tr.		
43-50	IIB22ca	22.4	47.9	29.7	0.2c	0.6c	1.6c	4.6c	15.4c	30.7	17.2	48.7	7.0	2	28	Tr.		
50-60+	IIB23ca	26.6	41.1	32.3	0.6c	1.2c	2.8c	7.3c	14.7c	26.6	14.5	45.0	11.9	1	31	Tr.		
7-15d	B2	27.5	44.0	28.5	-	0.2	0.6	2.7	24.0	31.3	12.7	56.1	3.5					
15-25d	B31ca	18.8	51.0	30.2	-	0.1	0.2	1.0	17.5	31.3	19.7	49.5	1.3					
25-36d	B32ca	16.6	52.5	30.9	-	0.1	0.2	1.0	15.3	32.3	20.2	48.3	1.3					
36-43d	IIB21ca	18.0	51.5	30.5	-	0.2	0.5	1.9	15.4	31.2	20.3	47.8	2.6					
43-50d	IIB22ca	24.5	45.7	29.8	0.2	0.7	1.6	5.0	17.0	31.1	14.6	50.9	7.5					
50-60+d	IIB23ca	28.7	41.3	30.0	0.7	1.2	2.9	7.6	16.3	26.7	14.6	46.9	12.4					

Depth (in.)	Organic carbon	Nitrogen	C/N		6E1b Carbonate as $CaCO_3$		Bulk density				Water content					pH
	Pct.	Pct.			Pct.		g/cc	g/cc	g/cc		Pct.	Pct.	Pct.			(1:1)
0-4					-											
4-7					-											
7-15					-											
15-25					9											
25-36					9											
36-43					6											
43-50					3											
50-60+					4											

Depth (in.)	Extractable bases: Ca	Mg	Na	K										Base saturation	
	meq/100 g													Pct.	Pct.

a. 25-50% organic matter.
b. > 50% mica-like. 5-25% carbonate.
c. < 5% mica-like. 5-25% carbonate.

Soil Type: *Buick loam
Soil Nos. S62Colo-3-6
Classification: Brown.
Location: 2,300 feet south, 200 feet east of the northwest corner of Sec. 2, T4S, R60W, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation 14 inches. Mean annual temperature 49°F. Growing season 150 days. Elevation 5,200 feet.
Vegetation: Native pasture. Blue grama, buffalograss, pricklypear, some western wheatgrass, sixweeks fescue, and wild alfalfa.
Parent material: Outwash, quarternary age. Modern solum probably mixed local aeolian material and outwash.
Physiographic position: Upland
Relief: Sloping 7 percent facing south. Slope about 400 feet long, grades toward small drainage way, and cut by smaller subdrainages. Pit about 100 feet from crest of slope.
Drainage: Surface drainage rapid, internal drainage medium in buried soil, but slower than in the modern soil. Moderate intake rate.
Moisture: Dry. Water table: None.
Stoniness: Few fine water-worn gravel of quartz and feldspar on the surface and throughout the profile.
Salt or alkali: None observed other than calcium carbonate. Erosion: Slight water and wind.
Described by: J. B. Brown, May 15, 1962.

Horizon and Lincoln Lab. No.	
A1 16991	0 to 4 inches. Dark grayish brown (10YR 4/2, moist) loam; light brownish gray (10YR 6/2, dry) weak medium subangular blocks breaking to weak very fine granules; soft when dry, very friable when moist; few fine water-worn gravels; clear smooth boundary.
B1 16992	4 to 7 inches. Dark grayish brown (10YR 4/2, moist) loam; brown (10YR 5/3, dry) moderate medium prisms breaking to moderate medium subangular blocks; slightly hard when dry, very friable when moist; thin [illegible] water-worn gravel; many roots; clear smooth boundary.
B2t 16993	7 to 15 inches. Dark brown (10YR 4/3, moist and crushed) clay loam; brown (10YR 5/3, dry) moderate medium prisms breaking to strong fine angular and subangular blocks; hard when dry, friable when moist; thin patchy clay films on ped surfaces; bleached sand grains common in the upper part; dark staining on ped surfaces.
B31ca 16994	15 to 25 inches. Brown (10YR 5/3, moist) light silty clay loam; pale brown (10YR 6/3, dry) moderate medium prisms breaking to strong fine subangular blocks; very hard when dry, friable when moist; violent effervescence; thin patchy clay films on peds; clear smooth boundary.
B32ca 16995	25 to 36 inches. Brown (10YR 5/3, moist) light silty clay loam; pale brown (10YR 6/3, dry) moderate medium prisms breaking to moderate fine subangular blocks; very hard when dry, friable when moist; violent effervescence; common medium distinct lime concretions; thin patchy clay films on vertical faces; gradual smooth boundary.
II B21ca 16996	36 to 43 inches. Yellowish brown (10YR 5/4, moist) silty clay loam; light yellowish brown (10YR 6/4, dry) moderate medium prisms breaking to moderate medium and fine subangular blocks; slightly hard when dry, friable when moist; strong effervescence; few thin patchy clay films present; many very fine pores; clear smooth boundary.
II B22ca 16997	43 to 50 inches. Brown (7.5YR 5/5, moist) clay loam; light brown (7.5YR 6/5, dry) moderate coarse prisms; slightly hard when dry, friable when moist; violent effervescence; common medium distinct lime concretions; thin patchy clay films; many fine pores; clear smooth boundary.
II B23ca 16998	50 to 60 inches plus. Brown (7.5YR 5/5, moist) clay loam; light brown (7.5YR 6/5 dry) moderate medium to coarse prisms breaking to weak medium subangular blocks; slightly hard when dry, friable when moist; violent effervescence; very few thin patchy clay films on vertical faces; many fine pores.

Remarks: [illegible]

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Buick loam SOIL Nos. S61Colo-3-8 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 15541-15549 February 1965

Depth (in.)	Horizon	1B1a Total Sand (2-0.05)	Total Silt (0.05-0.002)	Total Clay (< 0.002)	Size class and particle diameter (mm) 3A1 Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Silt (0.05-0.02)	Silt: Int. III (0.02-0.002)	Silt: Int. II (0.2-0.02)	(2-0.1)	3A1a Clay: Carbonate	3A1a Clay: Noncarbonate	Coarse fragments 2A2: > 2 Pct.	Coarse fragments 2A2: 2-19 Pct. of < 2mm	Coarse fragments 2A2: 19-76 Pct. of < 2mm
		Pct. of < 2 mm																
0-3	A1	42.1	47.1	10.8	0.8	1.6	3.3	9.3	27.1	36.7	10.4	68.6	15.0		11	Tr.		
3-6	B1	40.4	37.4	22.2	1.0	1.5	3.5	10.1	24.3	28.6	8.8	58.1	16.1		22	Tr.		
6-10	B2t	32.8	40.9	26.3	0.5	1.1	2.5	7.0	21.7	30.9	10.0	56.3	11.1	-	26	Tr.		
10-12	B2ca	32.2	42.7	25.1	0.6a	1.1a	2.4a	6.8a	21.3a	31.7	11.0	56.6	10.9	Tr.	25	Tr.		
12-24	IIB21ca	32.3	41.9	25.8	0.8a	1.3a	2.4a	6.9a	20.9a	29.0	12.9	53.5	11.4	4	22	Tr.		
24-32	IIB22ca	32.4	41.4	26.2	1.4a	1.0a	2.3a	6.8a	20.9a	29.1	12.3	53.8	11.5	4	22	Tr.		
32-42	IIIB21ca	35.4	33.2	31.4	1.6a	1.5a	3.0a	13.5a	15.8a	19.0	14.2	42.3	19.6	3	28	Tr.		
42-55	IIIB22ca	24.8	41.3	33.9	1.0a	0.7a	1.6a	7.8a	13.7a	23.5	17.8	41.9	11.1	3	31	Tr.		
55-72	IIIB23ca	37.3	31.8	30.9	1.5a	1.6a	2.8a	14.1a	17.3a	18.5	13.3	44.3	20.0	1	30	Tr.		
10-12b	B2ca	33.0	41.6	25.4	0.6	1.0	2.4	7.1	21.9	31.0	10.6	56.5	11.1					
12-24b	IIB21ca	35.9	37.8	26.3	0.7	1.2	2.8	7.7	23.5	27.0	10.8	54.5	12.4					
24-32b	IIB22ca	35.0	38.0	27.0	0.8	1.0	2.2	7.7	23.3	26.5	11.5	53.9	11.7					
42-55b	IIIB22ca	27.3	36.3	36.4	1.0	0.7	1.7	8.7	15.2	19.1	17.2	39.3	12.1					
55-72b	IIIB23ca	38.9	31.5	29.6	1.6	1.7	3.0	14.3	18.3	17.8	13.7	44.5	20.6					

Depth (in.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6E1c Carbonate as $CaCO_3$	6C1a Ext. Iron as Fe	Bulk density: 4A1c 30-Cm.	Bulk density: 4A1b Air-Dry	4D1 COLE e	Water content: 4B3 30-Cm.	Water content: 4B1b 1/3-Bar	Water content: 4B2 15-Bar	4C1 1/3- to 15-Bar in. per horizon	pH: 1:10	8C1a pH (1:1)
	Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct.	Pct.			
0-3	1.32	0.097	14	-	0.6			1.38			11.1	5.3		6.8	6.6
3-6	0.92	0.096	10	-	0.8						19.0	9.2		6.8	6.4
6-10	0.76	0.087	9	Tr.	0.8		1.36	1.50	0.12	24.0	20.6	11.0	0.5	7.8	7.4
10-12	0.55	0.086	6	6	0.6							10.9		8.3	7.8
12-24	0.41	0.053	8	10	0.6			1.68			20.7	10.2		8.5	8.1
24-32	0.29			9	0.7						18.8	10.4		8.6	8.2
32-42	0.16			7	0.7			1.90			22.0	12.1		8.8	8.3
42-55	0.07			6	0.7						22.0	14.0		8.7	8.2
55-72	0.03			3	0.8							12.2		8.7	8.2

Depth (in.)	Extractable bases 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	5B1a Sum	6H1a Ext. Acidity	Cat. Exch. Cap. 5A3a Sum Cations	5A1a NH_4OAc	Ratios to Clay: 8D2 NH_4OAc CEC c	8D1 NH_4OAc CEC d	8D1 Ext. Iron d	8D1 15-Bar Water d	8D3 Ca/Mg	Base saturation: 5C3 Sum Cations	5C1 NH_4OAc
	meq/100 g													Pct.	Pct.
0-3	6.7	1.7	Tr.	0.7	9.1	2.6	11.7	9.9	0.92	0.92	0.06	0.49	3.9	78	92
3-6	12.1	3.0	Tr.	0.8	15.9	2.8	18.7	16.4	0.74	0.74	0.04	0.41	4.0	85	97
6-10			Tr.	0.9				20.6	0.78	0.78	0.03	0.42			
10-12			Tr.	0.7				18.5	0.74	0.74	0.02	0.43			
12-24			0.1	0.6				16.4	0.74	0.64	0.02	0.40			
24-32			0.2	0.5				17.1	0.78	0.65	0.03	0.40			
32-42			0.7	0.4				20.0	0.71	0.64	0.02	0.38			
42-55			1.0	0.6				23.1	0.74	0.68	0.02	0.41			
55-72			1.0	0.5				20.6	0.69	0.67	0.03	0.39			

a. 5-25% carbonate.
b. Analysis after carbonate removal (see method 1B3).
c. Noncarbonate clay.
d. Total clay.
e. Coefficient of linear extensibility.

Observations of fabric with stereoscopic microscope: No clay films observed in the B1, B2, or B3. B2 has smooth planar surfaces; sand grains protrude. Classify three horizons as 0 or 1, probably 0.

Micromorphology (Method 4E1). Essentially no clay films observed in B2. Perhaps here and there a very small one is tucked away in an out-of-the-way spot. But they are extremely sparse and small.

Soil Type: *Buick loam
Soil Nos.: S61Colo-3-8
Classification: Brown.
Location: 2,300 feet south, 89 feet east of the northwest corner of Sec. 2, T4S, R6OW, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation of 14 inches. Mean annual temperature 49° F. Growing season 150 days. Elevation 5,200 feet.
Vegetation: Native pasture. Blue grama, buffalograss, pricklypear, some western wheatgrass, sixweeks fescue, and wild alfalfa.
Parent material: Outwash, probably quarternary age. Modern solum probably mixed local aeolian material and outwash.
Physiographic position: Upland.
Relief: Sloping 7 percent facing south. Slope about 400 feet long, grades toward small drainage way, and out by smaller subdrainage. Pit about 100 feet from crest of slope.
Drainage: Surface drainage rapid, internal drainage medium in buried soil, but slower than in the loess soils. Moderate intake rate. Moisture: Moist to 12 inches. Usually dry. Water table: None.
Stoniness: Few fine water-worn gravel of quartz and feldspar on the surface and throughout the profile. Estimated less than 5 percent by volume.
Salt or Alkali: None observed other than calcium carbonate. Erosion: Slight water and wind erosion.
Described by: J. B. Brown, June 29, 1961.

Horizon and Lincoln Lab. No.

A1 15541 — 0 to 3 inches. Very dark grayish brown (10YR 3.5/2, moist) loam; grayish brown (10YR 5/2, dry) weak medium subangular blocks breaking to weak very fine granules; soft when dry, very friable when moist; few fine water-worn gravels; clear smooth boundary.

B1 15542 — 3 to 6 inches. Very dark grayish brown (10YR 3.5/2, moist) loam; dark grayish brown (10YR 4/2, dry) moderate medium prisms breaking to weak medium angular blocks; slightly hard when dry, very friable when moist; thin very patchy clay films on some vertical faces; few fine water-worn gravels, and many roots; clear smooth boundary.

B2t 15543 — 6 to 10 inches. Dark brown (10YR 4/3 moist and crushed) light clay loam; brown (10YR 4.5/3, dry) moderate medium to fine prisms breaking to moderate fine angular blocks; slightly hard when dry, friable when moist; thin patchy clay films on all ped surfaces; some dark stains on ped surfaces; few fine water-worn gravels; many roots penetrating peds; abrupt slightly wavy boundary.

B2ca 15544 — 10 to 12 inches. Brown (10YR 4.5/3, moist and crushed) heavy loam; brown (10YR 5.5/3, dry) moderate fine angular blocks; slightly hard when dry, friable when moist; thin patchy clay films on all ped surfaces; few fine water-worn gravels; many roots and pores; strong to violent effervescence; abrupt smooth boundary.

II B21ca 15545 — 12 to 24 inches. Brown (10YR 5/3, moist) light clay loam; pale brown (10YR 6/3, dry) weak to moderate medium prisms breaking to moderate medium and fine subangular blocks; hard when dry, friable when moist; thin patchy clay films on ped surfaces; roots and pores plentiful in this horizon; few fine water-worn gravel present; lime concretions are common medium and distinct; violent effervescence; gradual smooth boundary.

II B22ca 15546 — 24 to 32 inches. Brown (10YR 5/3, moist) clay loam; pale brown (10YR 6/3, dry) weak medium prisms breaking to moderate medium subangular blocks; hard when dry, firm when moist; thin very patchy clay films on some vertical faces; some roots and channels; few fine gravels present; lime concretions are common fine and distinct; violent effervescence; clear smooth boundary.

III B21ca 15547 — 32 to 42 inches. Yellowish brown (10YR 5/3.5, moist) clay loam; light yellowish brown (10YR 6.5/3.5, dry) strong coarse to very coarse prisms; very hard when dry, firm when moist; thin nearly continuous clay films; dark stains on ped surfaces; few roots; few fine water-worn gravels present; lime concretions are common medium to coarse and distinct; strongly effervescent between concretions; concretions are violently effervescent; gradual smooth boundary.

III B22ca 15548 — 42 to 55 inches. Yellowish brown (10YR 5/3.5, moist) clay loam; light yellowish brown (10YR 6.5/3.5, dry) moderate to strong coarse and very coarse prismatic; very hard when dry, firm when moist; thin nearly continuous clay films and some dark stains on peds; few fine water-worn gravels present; lime concretions are common medium to coarse and distinct; strongly effervescent between concretions; violently effervescent in concretions; gradual boundary.

III B23ca 15549 — 55 to 72 inches. Yellowish brown (10YR 5/3.5, moist) clay loam; light yellowish brown (10YR 6/3.5, dry) moderate coarse to very coarse prisms; very hard when dry, firm when moist; thin patchy clay films; few fine water-worn gravels present; lime concretions are common medium and distinct; strongly effervescent between concretions; concretions are violently effervescent.

Remarks: This soil is found on the side slopes beneath the Aeolian Loess caps, and above residual soils on shale at the foot of slopes. The buried soils are quite distinctive; although it is hard to distinguish a difference between them and the modern soil. Dark staining of ped surfaces and clay films are the distinguishing characteristics. The II B2ca horizon was separated as a buried horizon on consistence. It may be a B3ca horizon rather than a buried horizon.

Bureau of Public Roads Samples: A1, 0-3 inches; B2, 6-10 inches; III B22ca, 42-55 inches.

SELECTED PARTICLE-SIZE DATA

I&L No.	Horizon	Total Sand %	Percent of Total Sand: Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Ratio Coarse Over Fine Silt
15541	A1	42.1	1.9	3.8	7.8	22.1	64.4	3.5
15542	B1	40.4	2.5	3.7	8.7	25.0	60.1	3.3
15543	B2t	32.8	1.5	3.4	7.6	21.3	66.2	3.9
15544	B2ca	33.0*	1.8*	3.0*	7.3*	21.5*	66.4*	2.9
15545	II B21ca	35.9*	1.9*	3.3*	7.8*	21.4*	65.4*	2.5
15546	II B22ca	35.0*	2.3*	2.8*	6.3*	22.0*	66.6*	2.3
15548	III B22ca	27.3*	3.7*	2.6*	6.2*	31.9*	55.7*	1.1
15549	III B23ca	38.9*	4.1*	4.4*	7.7*	36.8*	47.0*	1.3

* Carbonate removed with pH-5 NaOAc buffer.

SOIL SURVEY LABORATORY Lincoln, Nebr. June 1961

SOIL TYPE *Cabin fine sandy loam LOCATION Gunnison County, Colorado

SOIL NOS. 859Colo-26-4 LAB. NOS. 12004-12009

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-3½	A11	21.6	18.7	6.4	7.7	5.4	27.7	12.5	24.5	12.3	Tr.	cosl
3½-8	A12	30.5	17.5	4.0	7.4	5.0	22.7	12.9	20.9	10.3	25	cosl
8-14	B1	16.0	19.6	9.0	12.6	7.8	21.0	14.0	25.7	9.4	20	cosl
14-22	B2	20.3	23.7	9.4	11.8	6.0	17.1	11.7	20.0	8.7	25	cosl
22-32	B3	20.9	23.9	9.9	12.0	5.3	16.3	11.7	19.6	7.6	26	cosl
32-41	C	20.1	26.1	12.2	15.9	6.2	12.7	6.8	20.0	6.5	34	lcos

pH ORGANIC MATTER 6C1a MOISTURE TENSIONS

Soil Type: *Cabin fine sandy loam.
Date: Sept. 1959, by W. Goddard, J. S. Allen, L. Juve, C. J. Fox
Area: Gunnison County, Colorado
Location: SW¼ of NW¼ of Sec. 16, T. 14 S., R. 82 W. Near east edge of photo 2719
Parent Material: Granitic glacial outwash
Physiographic position: Glacial outwash at elevation of 9,475 feet.
Topography: Surface of very gently sloping benchlike area with 2 percent gradient.
Drainage: Well drained
Vegetation: Big sagebrush (Artemisia tridentata), ring muhly (Mullenbergia torreyi), fescue, cacti, Jacob's ladder. About 70% of ground surface has vegetative cover.
Use: Rangeland Described by: Charles J. Fox.
Soil Nos.: S-59-Colo-26-4
Remarks: Gravel up to 1 inch in diameter occupy approximately 10 percent of surface area.

Lincoln Lab. No.	Horizon		
12004	A_{11}	0-3½ inches	Brown (10YR 4/3 dry) to dark brown (10YR 3/3 moist) fine sandy loam; weak very fine granular structure; soft when dry, very friable when moist, nonplastic when wet; sand grains stained; approximate pH 6.5; roots plentiful; lower boundary clear and wavy.
12005	A_{12}	3½-8 inches	Brown (10YR 4/3 dry) to dark brown (10YR 3/3 moist) fine sandy loam; weak medium angular blocky structure breaking to moderate fine granules; slightly hard when dry, very friable when moist, nonplastic when wet; sand grains stained; about 5 percent of horizon is gravel; approximate pH 6.5; roots plentiful; lower boundary clear and wavy.
12006	B_1	8-14 inches	Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) gravelly sandy clay loam; weak medium angular blocky structure breaking to medium fine granules; hard when dry, firm when moist, slightly plastic when wet; sandy grains stained;

SOIL SURVEY LABORATORY Lincoln, Nebr. June 1961

SOIL TYPE *Cabin fine sandy loam **LOCATION** Gunnison County, Colorado

SOIL NOS. S59Colo-26-5 **LAB. NOS.** 12010-12015

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-4	A11	11.4	12.2	6.6	10.2	9.4	35.8	14.4	34.6	15.8	Tr.	1
4-8	A12	9.3	11.2	7.0	11.8	11.3	34.1	15.3	36.5	14.9	Tr.	1
8-11	B1	10.3	11.8	7.7	13.4	11.9	29.5	15.4	36.2	12.2	Tr.	fsl/sl
11-22	B2	16.1	16.1	9.9	15.4	8.5	18.0	16.0	26.5	7.4	27	cosl
22-34	B3	9.0	16.7	9.5	15.3	11.1	24.6	13.8	33.2	10.2	45	cosl
34-41	C	14.1	22.8	11.6	17.6	10.0	16.6	7.3	27.6	7.7	31	cosl

[redacted]

Soil Type: *Cabin fine sandy loam.
Date: Sept. 1959, by W. Goddard, J. S. Allen, L. Juve, C. J. Fox
Area: Gunnison County, Colorado
Location: SW¼ of NE¼ of Sec. 22, T. 14 S., R. 82 W. Photo 2664. Directly north of Holt's Guest Ranch on benchlike area.
Parent material: Granitic glacial outwash
Physiographic position: Glacial outwash at an elevation of 9475 feet.
Topography: Very gently sloping benchlike area with 2 percent gradient.
Drainage: Well-drained.
Vegetation: Dominantly big sagebrush (Artemisia Tridentata), ring muhly (Muhlenbergia torreyi), Arizona fescue. Some Junegrass (Koleria cristata) and stonecrop (Sedum spp.) about 70 percent vegetative ground cover.
Use: Rangeland Described by: Charles J. Fox.
Soil Nos. S-59-Colo-26-5
Remarks: Gravel and a few small stones cover about 10 percent of surface area.

Lincoln Lab. No.	Horizon		
12010	A_{11}	0-4 inches	Brown (10YR 4/3 dry) to dark brown (10YR 3/3 moist) fine sandy loam; weak very fine granular structure; soft when dry, very friable when moist, nonplastic when wet; sand grains stained; approximate pH 6.5; roots plentiful; lower boundary abrupt and smooth.
12011	A_{12}	4-8 inches	Brown (10YR 4/3 dry) to dark brown (10YR 3/3 moist) fine sandy loam; weak medium angular blocky structure breaking to moderate fine granules; a few small gravel; slightly hard when dry, very friable when moist, nonplastic when wet; sand grains stained; approximate pH 6.0; roots plentiful; lower boundary clear and wavy.
12012	B_1	8-11 inches	Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) gravelly sandy clay loam; weak coarse porous platy structure breaking to weak medium angular blocky aggregates that in turn break to moderate fine granules; faint broken clay films; sand grains stained; hard when dry, firm when moist, plastic when wet; approximate pH 6.0; about 2 percent of volume of horizon made up of small stones; roots plentiful lower boundary clear and smooth.
12013	B_2	11-22 inches	Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) gravelly clay loam; weak coarse prismatic structure breaking to weak medium angular blocky peds that crush to moderate fine granules; faint complete clay films; very hard when dry, very firm when moist, plastic when wet; sand grains stained; approximate pH 5.5; about 3 percent of this layer is rounded stones; roots plentiful; lower boundary gradual and wavy.
12014	B_3	22-34 inches	Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) gravelly sandy clay loam; weak medium angular blocky structure breaking to moderate fine granules; extremely hard when dry, very firm when moist, plastic when wet; sand grains stained; about 8 percent rounded stones; roots few; approximate pH 6.0; lower boundary gradual and wavy.
12015	C	34-41 inches	Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) gravelly loamy sand; single grain structure; sand grains stained; approximate pH 6.0; rounded glacial stones occupy about 40 percent of this layer; no roots.

Bureau of Public Roads Samples: 0-8 inches, 8-32 inches, 32-41 inches.

SOIL SURVEY LABORATORY Lincoln, Nebr. 12/21/56

SOIL TYPE Campo clay loam **LOCATION** Baca Co., Colorado

SOIL NOS. S-55-Colo-5-1 **LAB. NOS.** 3512-3519

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-4	A1	0.2	1.9	5.4	6.1	10.0	56.7	19.7	46.2	23.1	-	sil
4-6	B1	-	1.0	3.0	3.9	5.9	45.3	40.9	32.7	20.3	-	sic
6-14	B21t	-	0.7	2.1	2.5	4.3	38.4	52.0	25.9	18.0	-	c
14-18	B22t	-	0.6	1.5	1.9	4.1	49.2	42.7	29.6	24.6	-	sic

Soil Type: Campo clay loam
Location: 650 feet west and 20 feet south of the northeast corner of Sec. 10, T33S; R47W; Baca County, Colorado.
Date of Sampling: October 6, 1955
Collector: A. J. Cline. **Described by: A. J. Cline**
Physiographic Position: Upland.
Topography: Nearly level to slightly concave area of less than 1 percent slope.
Drainage: Moderately well drained
Vegetation: Blue grama, Buffalo grass, Russian thistle
Use: Pasture
Soil Nos.: S55Colo-5-1 **Lincoln Laboratory Nos.:** 3512-3519

0-4 inches A_1	Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 3.6/2 moist) light silty clay loam; soft when dry, very friable when moist; moderate, fine crumb
LSL 3512	structure; noncalcareous; lower boundary clear and smooth.
4-6 inches B_1	Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) heavy silty clay loam; slightly hard to hard when dry, friable when moist; moderate to
LSL 3513	strong, very fine subangular blocky structure; non-calcareous; thin continuous tonhautchen; the soil aggregates in this horizon are weakly coated with light gray; lower boundary abrupt and smooth.
6-14 inches $B_{21}t$	Grayish brown (10YR 5/2.5 dry) to dark grayish brown (10YR 4/2.5 moist) silty clay; extremely hard when dry, very firm when moist; moderate to strong, medium
LSL 3514	prismatic structure breaking to strong, fine, angular blocks; noncalcareous; moderate continuous tonhautchen; lower boundary clear and smooth.
14-18 inches $B_{22}t$	Light brownish gray (10YR 6/2.5 dry) to grayish brown (10YR 5/2.5 moist) silty clay; extremely hard when dry, very firm when moist; moderate to strong, medium and
LSL 3515	fine, prismatic structure breaking to strong, fine angular blocks; calcareous; there is no visible segregation of lime; thin continuous tonhautchen; lower boundary gradual and smooth.
18-29 inches **B31ca**	Very pale brown (10YR 7/2.5 dry) to pale brown (10YR 6/2.5 moist) heavy silty clay loam; very hard when dry, friable when moist; weak to moderate, medium and pris-
LSL 3516	matic breaking to moderate, fine subangular blocks; strongly calcareous; this is a moderate lime horizon containing many large soft calcium carbonate concretions 1/4 to 1/8 inch in diameter; few very thin very patchy tonhautchen; lower boundary gradual and smooth.
29-40 inches **B32ca**	Very pale brown (10YR 7/3 dry) to pale brown (10YR 6/3 moist) silty clay loam; hard when dry, friable when moist; weak, medium prismatic breaking to weak, medium
LSL 3517	and fine, subangular block; violently calcareous; this is a moderate lime horizon containing moderate numbers of small concretions and some finely disseminated lime; lower boundary gradual and smooth.
40-52 inches C_{ca}	Very pale brown (10YR 7/3 dry) to pale brown (10YR 6/3 moist) silt loam; hard when dry, friable when moist; massive, to very weak, coarse subangular blocky structure;
LSL 3518	violently calcareous; this is a weak to moderate lime horizon containing very few of the concretions of the above two horizons but with some finely disseminated lime; lower boundary gradual and smooth.
52-60 plus inches C	Light yellowish brown (10YR 6/3.5 dry) to yellowish brown (10YR 5/4 moist) silt loam; hard when dry. friable when moist; massive; strongly calcareous;
LSL 3519	this is a weak to moderate lime horizon but contains noticeably less lime than the horizon above.

SOIL SURVEY LABORATORY Lincoln, Nebr. 12/21/56

SOIL TYPE Campo clay loam **LOCATION** Baca Co., Colorado

SOIL NOS. S-55-Colo-5-2 **LAB. NOS.** 3520-3526

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent)							3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-7	Ap	0.2	3.2	4.7	6.0	13.1	45.5	27 3	44.8	16 8	-	cl
7-16	B21	0.1	3.0	4.0	5.2	9.4	35.5	42.8	33.3	14.2	-	c
16-24	B22	0.1	1.5	2.3	3.4	10.0	41.8	40.9	35.6	18.1	-	sic
24-32	B31ca	0.1	0.8	1.4	2.5	8.5	47.1	39.6	35.7	21 3	-	sicl
32-41	B32ca	0.1	0.2	0.3	0.8	4.3	57.2	37.1	32.9	29.1		sicl
41-50	Cca	-	0.1	0.2	0.5	5.2	60.9	33.1	37.4	29.0	-	sicl
50-64+	C	-	-	0.1	0.4	5.3	63.7	30.5	39.9	29.4	-	sicl

	pH 8C1a		ORGANIC MATTER			EST. SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10³ MILLIMHOS PER CM 25°C.	6E1a		MOISTURE TENSIONS		
			6A1a	6B1a				$CaCO_3$ equivalent	GYPSUM m.e./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	4B2 15 ATMOS.
1:1	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N			%		%	%	%
7.9	8.3	8.4	0.91	.093	10			1				10.8
7.2	7.5	7.7	0 76	.079	10			-				17.5
7.8	8.3	8.4	0.52	.065	8			5				16.0
8.0	8.1	8.6	0.42	.051	8			8				16.1
8.0	8.6	8.7	0.35					13				15.6
8.1	8.6	8.8	0.28					15				14.4
8.3	8.9	9.0	0.22					11				14.2

5A1a	EXTRACTABLE CATIONS 5B1a						SATURATION EXTRACT SOLUBLE					
CATION EXCHANGE CAPACITY	6E2b	6G2b		6P2a	6Q2a							MOISTURE AT SATURATION
NH_4Ac	Ca	Mg	H	Na	K		Na	K				%
	milliequivalents per 100g. soil →						← milliequivalents per liter →					
22.0		3.3		0.1	2.0							
29.3	19.9	8.7		0.1	1.6							
25.8				0.1	1.5							
24.8				0.1	1.5							
24.0				0.2	1.3							
21.4				0.6	1.2							
22.4				1.1	1.3							

Soil Type: Campo clay loam
Location: 115 feet west and 40 feet north of the southeast corner of Sec. 33, T31S; R43W; Baca County, Colo.
Date of Sampling: October 6, 1955
Collector: A. J. Cline Described by: A. J. Cline.
Physiographic Position: Upland
Topography: A nearly level to slightly concave area having a slope of less than 1 percent.
Drainage: Moderately well drained
Vegetation: Winter wheat
Use: Cultivated land
Soil Nos.: S55Colo-5-2 Lincoln Laboratory Nos.: 3520-3526

0-7 inches (A_p)
LSL 3520
Grayish brown (10YR 5.5/2 dry) to dark grayish brown (10YR 4/2 moist) silty clay loam; soft when dry, very friable when moist; moderate, fine crumb structure; noncalcareous; lower boundary clear and smooth.

7-16 inches B_{21}
LSL 3521
Dark grayish brown (10YR 4.5/2 dry) to very dark grayish brown (10YR 3.5/2 moist) silty clay; extremely hard when dry, firm when moist; moderate to strong, medium prismatic structure breaking to strong, fine, angular block; noncalcareous; moderate continuous tonhautchen; lower boundary clear and smooth.

16-24 inches B_{22}
LSL 3522
Grayish brown (10YR 5.5/2.5 dry) to dark grayish brown (10YR 4.5/2.5 moist) silty clay; extremely hard when dry, firm when moist; moderate to strong, medium prismatic structure breaking to strong, fine, angular block; calcareous; there is no visible lime in this horizon; thin continuous tonhautchen; lower boundary gradual and smooth.

24-32 inches B_{31ca}
LSL 3523
Light brownish gray (10YR 6/2.5 dry) to grayish brown (10YR 5/2.5 moist) heavy silty clay loam; very hard when dry, firm when moist; weak to moderate, medium prismatic structure breaking to moderate, medium, angular and subangular blocks; strongly calcareous; this is a weak to moderate lime horizon containing common number of soft calcium carbonate concretions, lower boundary gradual and smooth.

32-41 inches B_{32ca}
Light brownish gray (10YR 6.5/2.5 dry) to grayish brown (10YR 5.5/2.5 moist) silty clay loam; hard when dry,

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Chubbs clay loam **LOCATION** Chaffee County, Colorado

SOIL NOS. S58Colo-8-6 **LAB. NOS.** 9071-9074

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	3A1 2A2 > 2 (<19mm)	TEXTURAL CLASS
0-2	A2	2.8a	3.0a	2.3a	6.2a	17.8a	50.0	17.9	51.0	21.3	24	sil1/1
2-9	B2t	2.9a	2.5a	2.0a	4.6a	12.3a	33.3	42.4	31.8	17.2	36	c
9-13	B3ca	10.2b	4.8b	2.7b	8.3b	17.2b	33.6	23.2	41.8	14.4	52	1
13-17	Cca	7.1c	6.2c	3.8c	10.2c	17.4c	34.3	21.0	40.8	17.3	56	1

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron $\%Fe_2O_3$ 6C1a		6E1a $CaCO_3$ equivalent %		MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.6			2.61	0.116	22	1.6						8.3
6.4			1.42	0.087	16	2.2						16.4
7.9			2.46	0.138	18	1.1		23				13.6
8.0			3.14	0.154	20	0.7		40				15.0

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6G2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	Sum Bases 5B1a	Sum Cations 5A3a	Ca/Mg 8D3
←	milliequivalents per 100g. soil →							← me/100g →		
18.6	14.5	3.5	5.2	<0.1	0.8	101	78	18.8	24.0	4.1
34.3	24.9	8.4	5.4	<0.1	0.8	99	86	34.1	39.5	3.0
23.1		5.1	<0.1	<0.1	0.3					
20.7		5.6	<0.1	<0.1	0.2					

Soil Type: Chubbs clay loam. Described by: A. J. Cline
Location: The SW¼ of Sec. 33, T13S, R77W, Chaffee County, Colorado.
Date of Sampling: September 1957.
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline.
Physiographic Position: Upland mountain side at an elevation of approximately 9,500 feet.
Topography: Moderate convex slope of approximately 8 percent facing north.
Drainage: Well drained. Vegetation: Spruce, fir, aspen.
Use: National Forest Service land
Soil Nos.: S58Colo-8-6

Lincoln Lab. No.	Horizon		
	A_{oo}	1½-0 inches	An organic mat made up mostly of undecomposed pine needles. Horizon not sampled.
9071	A_2	0-2 inches	Light brownish gray or light gray (10YR 6.5/2 dry) to grayish brown (10YR 5/2 moist) loam; soft when dry, very friable when moist; weak to moderate fine platy structure breaking to moderate fine granules; noncalcareous; lower boundary abrupt and smooth.
9072	B_{2t}	2-9 inches	Brown (7.5YR 5/4 dry) to brown or dark brown (7.5YR 4/4 moist) gravelly clay loam; hard when dry, friable when moist; moderate medium subangular blocky structure, breaking to moderate to strong very fine subangular blocks; noncalcareous; there are thick continuous clay skins on the surfaces of most of the soil aggregates; approximately 20 percent of this horizon is gravel; lower boundary gradual and smooth.
9073	B_{3ca}	9-13 inches	Grayish brown or light brownish gray (10YR 5.5/2 dry) to brown (10YR 4.5/3 moist) gravelly loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure, breaking to moderate fine crumb; violently effervescent; this is a weak horizon of lime accumulation with some visible lime occurring as concretions and as coatings on the gravel; approximately 30 percent of this horizon is gravel; lower boundary gradual and smooth.
9074	C_{ca}	13-17 inches	White (10YR 8/2 dry) to light brownish gray (10YR 6/2 moist) stony loam; slightly hard when dry, very friable when moist; massive; violently effervescent; this is a prominent horizon of lime accumulation with visible lime occurring in finely divided forms; approximately 50 percent of this horizon is stone; lower boundary gradual and smooth.
	D	17-23 inches	Partially weathered and fractured bedrock limestone of Pennsylvanian age. This horizon was not sampled.

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Chubbs clay loam **LOCATION** Chaffee County, Colorado

SOIL NOS. S58Colo-8-8 **LAB. NOS.** 9078-9081

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-2	A1	1.8a	1.5a	1.0a	4.8a	14.2a	52.3	24.4	43.3	26.6	Tr.	sil
2½-6	B2t	1.1a	1.1a	0.6a	2.8a	11.0a	44.0	39.4	33.2	23.9	10	sicl
6-11	B3	5.2b	2.5b	1.2b	4.4b	14.4b	42.2	30.1	36.7	23.0	35	cl
11-19	Cca	4.2b	4.8b	3.0b	6.5b	11.0b	40.8	29.7	29.0	26.9	35	cl

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron $\%Fe_2O_3$ 6C1a		6E1a $CaCO_3$ equivalent %		MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.7			9.12	0.460	20	1.9		<1				17.2
7.3			1.65	0.097	17	2.6		2				13.9
7.7			1.74	0.117	15	2.2		13				11.6
7.7			5.46	0.259	21	1.2		52				21.8

5A1a CATION EXCHANGE CAPACITY MI_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	Sum Bases 5B1a	Sum Cations 5A3a	Ca/Mg 8D3
←	← milliequivalents per 100g. soil →							← me/100g →		
35.9	34.8	2.7	8.6	<0.1	1.6	109	82	39.1	47.7	12.9
25.8		1.8	3.3	<0.1	1.1					
23.2		1.7	0.4	<0.1	0.5					
25.4		1.5	<0.1	<0.1	0.2					

a. Few irregular dark brown to black concr. (Fe-Mn?) Also, common $CaCO_3$ concr.
b. Few irregular dark brown to black concr. (Fe-Mn?) Also, many $CaCO_3$ concr.

Soil Type: Chubbs clay loam. **Described by: A. J. Cline**
Location: The SW¼ of Sec. 23, T13S, R77W, Chaffee County, Colorado.
Date of Sampling: September 1957
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline
Physiographic Position: Upland mountainous area at an elevation of approximately 9,500 feet.
Topography: Moderately steep convex slope of approximately 20 percent facing west.
Drainage: Well drained. Vegetation: Spruce, fir, aspen, with a moderate to thin understory of grasses and sedges.
Use: National Forest Service land.
Soil Nos.: S58Colo-8-8

Lincoln Lab. No.	Horizon		
9078	A_1	0-2 inches	Dark gray (10YR 4/1 dry) to very dark grayish brown (10YR 3/2 moist) loam; soft when dry, very friable when moist; moderate fine crumb structure; noncalcareous; lower boundary abrupt and smooth. The surface 1/4" of this horizon is an organic mat made up of partially decomposed and undecomposed forest refuse.
	A_2	2-2½ inches	Pink (7.5YR 7/4 dry) to brown (7.5YR 5/3 moist) gravelly loam; soft when dry, very friable when moist; weak to moderate fine platy structure; noncalcareous; this is a thin, but in places distinct horizon, however, it may be absent in some parts of the area. Because of its inconsistency and thinness it was not sampled; lower boundary abrupt and smooth.
9079	B_{2t}	2½-6 inches	Brown (7.5YR 5/4 dry) to brown or dark brown (7.5YR 4/4 moist) stony clay loam; hard when dry, very friable when moist; moderate, medium and fine subangular blocky structure; noncalcareous; there are moderate continuous clay skins on the surfaces of the soil aggregates and coating the rock surfaces; approximately 40 percent of this horizon is stone; lower boundary gradual and irregular.
9080	B_3	6-11 inches	Brown (10YR 5/3 dry) to dark brown or brown (10YR 4/3 moist) stony light clay loam; hard when dry, very friable when moist; weak to moderate fine subangular blocky structure breaking to moderate fine granules; strongly effervescent; there are thin patchy clay skins on both the horizontal and

SOIL SURVEY LABORATORY Lincoln, Nebr. May 1959

SOIL TYPE Colby silt loam **LOCATION** Prowers County, Colorado

SOIL NOS. S58Colo-50-2 **LAB. NOS.** 9675-9681

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-2	Ap1	0.2	0.4	0.6a	11.1a	33.6a	38.2	15.9	70.3	11.1	-	l
2-4	Ap2	<0.1	0.1	0.2a	8.1a	25.2a	47.7	18.7	64.5	15.4	-	l
4-11	AC	<0.1	0.1	0.2a	5.6a	21.8a	54.7	17.6	62.5	18.9	-	sil
11-18	C1	<0.1	0.1	0.1a	3.5a	18.8a	59.6	17.9	60.7	20.8	Tr.	sil
18-27	C2	<0.1	0.1	0.1b	5.5b	21.2b	56.2	16.9	63.8	18.5	-	sil
27-44	C3	<0.1	0.1	0.2b	7.6b	23.1b	55.6	13.4	68.1	17.2	-	sil
44-60+	C4	<0.1	0.1	0.1b	6.2b	25.5b	56.2	11.9	69.8	17.4	-	sil

DEPTH INCHES	pH 8C1a 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
0-2	7.9			0.72	0.082	9	<0.20	0.7	5				7.3
2-4	7.8			0.72	0.081	9	<0.20	0.5	8				9.5
4-11	7.9			0.51	0.057	9	<0.20	0.5	9				8.6
11-18	8.0			0.34	0.043	8	<0.20	0.5	8				8.4
18-27	8.0			0.34	0.039	9	<0.20	0.7	7				7.6
27-44	8.2			0.16			<0.20	1.0	6				6.7
44-60+	8.5			0.14			<0.20	0.9	6				6.5

DEPTH INCHES	5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a Ca	Mg	H	6P2a Na	6Q2a K	5D2 EXCH. Na %	SATURATION EXTRACT SOLUBLE 8A1 6P1a Na	6Q1a K			8A MOISTURE AT SATURATION %
		milliequivalents per 100g. soil						milliequivalents per liter				
0-2	11.2				<0.1	1.0	<1	0.4	1.0			44.4
2-4	11.6				<0.1	0.7	<1	0.3	0.5			51.2
4-11	12.0				<0.1	0.5	<1	0.3	0.3			51.2
11-18	15.5				0.1	0.7	1	0.4	0.3			49.2
18-27	14.4				0.1	0.7	1	0.8	0.3			45.9
27-44	13.0				0.8	0.8	5	4.1	0.4			43.6
44-60+	13.2				1.6	0.8	10	5.9	0.3			44.0

a. Trace $CaCO_3$ concr.
b. Few $CaCO_3$ concr.

Soil Type: Colby silt loam.
Classification: Sierozem.

[redacted]

County, Colorado.

Date Sampled: November 4, 1958
Climate: Continental type climate, average annual precipitation 13 inches, elevation 3,810 feet. Frost free season 165 days.
Vegetation: Dryland, wheat-fallow; wheat , 1958. Parent Material: Loess or aeolian
Physiographic position: Upland. Relief; Gently rolling, 2% slope.
Drainage: Good. Moisture: Dry. Watertable: None encountered. Stoniness: None.
Salt or Alkali: None observered other than calcium carbonate. Erosion: Moderate wind erosion.. Soil Nos.: S-58-Colo-50-2
Described by: E. Milton Payne.

Lincoln Lab No.	Horizon		
9675	Ap_1	0-2 inches	Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) silt loam; weak fine subangular blocky structure breaking to weak fine granular; soft when dry, very friable moist; strongly calcareous; clear smooth boundary.
9676	Ap_2	2-4 inches	Pale brown (10YR 6/3 dry) to brown (10YR 4.5/3 moist) loam; massive to weak coarse platy; very hard when dry, friable moist; this is a tillage pan with light colored streaks (10YR 7/3 dry), strongly calcareous; clear smooth boundary; appears to be abrupt due to plow depth.
9677	AC	4-11 inches	Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist and crushed) loam; very weak coarse prismatic breaking to very weak coarse subangular blocky structure; hard when dry, very friable moist;violently calcareous; gradual smooth boundary.
9678	C_1	11-18 inches	Very pale brown (10YR 6.5/3 dry) to brown (10YR 5/3 moist) (10YR 5.5/3 crushed moist) loam; weak coarse prismatic breaking to very weak medium to coarse subangular blocky structure; slightly hard when dry, very friable moist; violently calcareous, containing a few lime nodules; gradual smooth boundary.
9679	C_2	18-27 inches	Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) (10YR 5/2.5 crushed) very fine sandy loam; massive to a very weak coarse subangular blocky structure; slightly hard when dry, very friable moist, contains many krotovinas; violently calcareous; gradual smooth boundary.

SOIL SURVEY LABORATORY Lincoln, Nebr. May 1959

SOIL TYPE Colby silt loam **LOCATION** Prowers County, Colorado

SOIL NOS. S58Colo-50-3 **LAB. NOS.** 9682-9687

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-3	A1p	0.2	0.3	0.5a	9.2a	41.3a	32.6	15.9	72.6	9.2	-	l
3-6	A12	<0.1	<0.1	0.1a	4.0a	22.5a	50.4	23.0	58.1	18.4	-	sil/l
6-11	AC	<0.1	0.1	0.1a	3.0a	19.2a	55.8	21.8	57.3	20.4	-	sil
11-23	C1	<0.1	0.1	0.1a	2.8a	18.3a	58.8	19.9	59.1	20.5	-	sil
23-31	C2	<0.1	0.1	0.1a	2.9a	18.7a	59.9	18.3	61.3	19.9	-	sil
31-60+	C3	<0.1	0.1	0.1a	2.6a	18.6a	62.1	16.5	63.1	19.9	-	sil

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.9			0.73	0.080	9	<0.20	0.9	5				7.8
7.9			0.66	0.078	8	<0.20	0.5	12				11.2
7.9			0.52	0.062	8	<0.20	0.5	11				10.2
8.0			0.36	0.043	8	<0.20	0.5	8				8.9
8.0			0.24	0.030	8	<0.20	0.6	7				8.3
8.1			0.18			<0.20	0.6	6				7.9

5A1a CATION EXCHANGE CAPACITY me./100g. Soil	EXTRACTABLE CATIONS Ca	Mg	H	6P2a Na	6Q2a K	5D2 EXCH.	8A1 SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	8A MOISTURE AT SATURATION

Soil Type: Colby silt loam.
Classification: Sierozem (Regosol)
Location: 150 ft. S, 450 ft. E of NW corner, Section 34, T23S., R47W., Prowers County, Colorado.
Date Sampled: November 4, 1958
Climate: Continental climate, average annual precipitation 13.00 inches, elevation 3,850 feet. Frost free season 160 days.
Vegetation: Wheat-fallow, wheat, 1958. Parent Material: Loess.
Physiographic position: Upland. Relief: Nearly level, 2% slope. Drainage: well
Moisture: Slightly moist throughout profile. Watertable: None encountered.
Salt or Alkali: None observed. Erosion: Moderate erosion, primarily wind.
Soil Nos. S-58-Colo-50-3 Stoniness: None.
Described by: E. Milton Payne.

Lincoln Lab. No.	Horizon		
9682	A_1p	0-3 inches	Light brownish gray (10YR 6/2.5 dry) to dark grayish brown (10YR 4/2.5 moist) silt loam; very weak fine subangular blocky structure breaking to weak fine granular; slightly hard dry, very friable moist; violently calcareous; abrupt smooth boundary, caused by tillage implements.
9683	A_{12}	3-6 inches	Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) mottled with lighter colored material, light gray (10YR 7/2 dry) to pale brown (10YR 6/3 moist) loam; weak very coarse platy; very hard when dry, friable moist; violently calcareous; this is a tillage pan; abrupt smooth boundary.
9684	AC	6-11 inches	Light gray to light brownish gray (10YR 6.5/2 dry) to brown (5.5/3 moist) silt loam; very weak coarse prismatic breaking to very weak coarse subangular blocky structure; hard when dry, very friable moist; few thin patchy clay skins on vertical faces of peds; violently calcareous with few small lime concretions; gradual smooth boundary.
9685	C_1	11-23 inches	Light gray to light brownish gray (10YR 6.5/2 dry) to grayish brown (10YR 5/2.5 moist) loam; very weak coarse prismatic breaking to very weak medium subangular blocky structure; slightly hard when dry, very friable moist; violently calcareous with numerous lime spots; gradual smooth boundary.
9686	C_2	23-31 inches	Light gray (10YR 7/2 dry) to grayish brown (10YR 5/2.5 moist) very fine sandy loam; massive; slightly hard when dry, very friable moist; violently calcareous with few lime spots; gradual smooth boundary.
9687	C_3	31-60 + inches	Very pale brown (10YR 7/2.5 dry) to brown (10YR 5.5/3 moist) very fine sandy loam; massive; slightly hard when dry; very friable moist; violently calcareous with many fine pores.

Bureau of Public Roads Sample:

C - 31 - 60 +

SCS-420 a
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Colby silt loam SOIL Nos. S60Colo-50-1 LOCATION Prowers County, Colorado
SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14653-14655 January 1966

Depth (In.)	Horizon	1B1a Size class and particle diameter (mm) 3A1: Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	Clay 3A1a: Carbonate	Clay 3A1a: Noncarbonate	Coarse fragments: 2A2 >2 (<19) Pct.	Coarse fragments: 2 – 19	Coarse fragments: 19 – 76
		← Pct. of < 2 mm													→		← Pct. of < 76 mm	→
0-4	A1	21.5	59.0	19.5	-	0.3a	0.4b	1.8b	19.0b	39.4	19.6	59.7	2.5	1	19	Tr.		
4-13	AC	14.2	60.0	25.8	0.1c	0.2b	0.3b	1.4b	12.2b	35.9	24.1	49.1	2.0	5	21	-		
13-30	C1	12.6	64.5	22.9	0.1b	0.1b	0.2b	0.8b	11.4b	41.0	23.5	53.0	1.2	3	20	-		

Depth (In.)	6A1a Organic carbon d/ Pct.	6B1a Nitrogen Pct.	C/N		6E1a Carbonate as $CaCO_3$ Pct.		Bulk density: g/cc	Bulk density: 4A1c 30-cm. g/cc	Bulk density: 4A1b Air-Dry g/cc	4D1 COLE e/	Water content: 4B3 30-cm. Pct.	Water content: 4B1b 1/3-Bar Pct.	Water content: 4B2 2-Bar Pct.	Water content: 4B2 15-Bar Pct.	4C1 1/3- to 15-Bar in./in.	pH: 8C1b Sat. Paste	pH: 8C1a 1:1	pH: 8C1a 1:10
0-4	1.33	0.124	11		5			1.22	1.32	0.028	23.9	22.4	17.6	10.9	0.14	7.6	7.7	8.5
4-13	0.89	0.095	9		11			1.24	1.34	0.028	24.3	22.4	16.9	12.6	0.12	7.6	7.6	8.5
13-30	0.36	0.035	10		9									10.9		7.5	7.8	8.6

Depth (In.)	Extractable bases 5B1a: Ca	Mg	6P2a Na	6Q2a K			Cat. Exch. Cap.	Cat. Exch. Cap.: 5A1a NH_4OAc	8A1 Water extract from saturated paste: Ca	Mg	6P1a Na	6Q1a K		CO_3	HCO_3	Cl	SO_4	8A1a Electrical conductivity
	← meq/100 g							→	← meq/liter								→	mmho/cm
0-4			Tr.	1.4				17.9			0.4	0.8						0.8
4-13			0.1	1.1				18.6			0.7	0.5						0.8
13-30			0.1	1.2				18.1			0.7	0.6						0.7

Depth (In.)	8A Water at Saturation Pct.	5D2 Exchangeable Na Pct.		Gypsum Pct.	Ratios to Clay: 8D1 NH_4OAc CEC	Ratios to Clay: 8D2 NH_4OAc CEC f/	Ratios to Clay: 8D1 15-Bar Water
0-4	53.1	<1			0.92	0.94	0.56
4-13	55.9	<1			0.72	0.88	0.49
13-30	50.6	<1			0.79	0.90	0.48

a. 5-25% carbonate. 25-50% organic matter.
b. 5-25% carbonate.
c. 25-50% organic matter.
d. 5.0 kg/m^2 to 20 inches.
e. Coefficient of Linear Extensibility.
f. Noncarbonate clay.

Soil Type: Colby silt loam
Soil Nos.: S60Colo-50-1
Location: 200 feet south and 300 feet west of the northeast corner, Sec. 7, T22S, R44W, Prowers County, Colorado.
Climate: Continental climate, average annual precipitation 13 to 15 inches, frost-free season 165 days.
Elevation: 3,550 feet.
Parent Material: Loess.
Physiographic Position: Upland.
Relief: Nearly level, 0-1 percent slopes.
Drainage: Good.
Moisture: Moist to 10 inches, dry below.
Water Table: None.
Stoniness: None.
Salt or Alkali: None.
Erosion: None.
Present Use: Native range.
Described by: James P. Pannell, November 14, 1960.

Horizon and
Lincoln
Lab. No.

A1
14653 — 0 to 4 inches. Light grayish brown (10YR 5.5/2 dry) to brown (10YR 4/3 moist and 4/2.5 moist crushed) silt loam; weak very fine granular structure; dry soft, moist very friable; strongly effervescent; clear smooth boundary.

AC
14654 — 4 to 13 inches. Light grayish brown (10YR 5.5/2 dry) to dark grayish brown (10YR 4/2 moist and 4/2.5 moist crushed) silt loam; very weak coarse prismatic structure breaking to very weak medium subangular blocky; dry slightly hard, moist friable; violently effervescent; clear smooth boundary.

C1
14655 — 13 to 30 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist and crushed) silt loam; weak coarse subangular blocky structure breaking to very weak medium subangular blocky; dry slightly hard, moist very

[redacted]

C2 — 30 to 60 inches plus. Very pale brown (10YR 7/3 dry) to yellowish brown (10YR 5/4 moist and crushed)

[redacted]

SCS-420 a
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Colby silt loam SOIL Nos. 860Colo-50-2 LOCATION Prowers County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14656-14658 January 1966

Depth (In.)	Horizon	1B1a Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1 Clay Carbonate	3A1a Clay Non-carbonate	Coarse fragments: 2A2 > 2 (<19) Pct.	Coarse fragments: 2 – 19 Pct. of < 76 mm	Coarse fragments: 19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0-3	A1	19.0	64.8	16.2	0.1a	0.6a	0.6	2.3	15.4	43.4	21.4	60.5	3.6	-	16	Tr.		
3-15	AC	20.0	57.9	22.1	0.1a	0.5b	0.6b	3.1b	15.7b	35.3	22.6	53.3	4.3	4	18	Tr.		
15-42	C1	20.1	63.5	16.4	-	0.2b	0.4b	2.9b	16.6b	41.9	21.6	60.8	3.5	2	14	Tr.		

Depth (In.)	6A1a Organic carbon a/ Pct.	6B1a Nitrogen Pct.	C/N		6E1c Carbonate as $CaCO_3$ Pct.		Bulk density: 4A1g 30-cm. g/cc	4A1b Air-Dry g/cc	4B1 COLE a/	Water content: 4B3 30-cm. Pct.	4B1b 1/3-Bar Pct.	4B2 2-Bar Pct.	4B2 15-Bar Pct.	4C1 1/3-Bar to 15-Bar in./in.	pH: 8C1b Sat. Paste	8C1a 1:1	8C1a 1:10
0-3	1.30	0.118	11		2			1.30	1.38	0.020	22.3	20.6	16.3	9.9	0.14	7.5	7.7	8.4
3-15	0.89	0.093	10		8			1.27	1.37	0.024	23.9	20.2	15.1	11.0	0.12	7.5	7.7	8.5
15-42	0.25	0.026	10		7									8.5		7.6	8.0	8.9

Depth (In.)	Extractable bases 5B1a: Ca	Mg	6P2a Na	6Q2a K			Cat. Exch. Cap.	5A1a NH_4OAc	8A1 Water extract from saturated paste: Ca	Mg	6P1a Na	6Q1a K		CO_3	HCO_3	Cl	SO_4	8A1a Electrical conductivity mmho/cm
	meq/100 g								meq/liter									
0-3																		
3-15																		
15-42																		

Soil Type: Colby silt loam
Soil Nos.: S60Colo-50-2
Location: 0.2 mile north and 385 feet west of south quarter corner, Sec. 34, T22S, R43W. Prowers County, Colorado.
Climate: Continental climate, average annual precipitation 13 to 15 inches, frost-free season 165 days.
Elevation: 3,550 feet.
Parent Material: Loess.
Physiographic Position: Upland.
Relief: Nearly level, 0-1 percent slopes.
Drainage: Good.
Moisture: Moist.
Water Table: None.
Stoniness: None.
Salt or Alkali: None.
Erosion: None.
Present Use: Native range.
Described by: James P. Pannell, November 18, 1960.

Horizon and Lincoln Lab. No.	
A1 14656	0 to 3 inches. Light grayish brown (10YR 5.5/2.5 dry) to dark grayish brown (10YR 4/2 moist and crushed) silt loam; weak very fine granular structure; dry soft, moist very friable; strongly effervescent; clear smooth boundary.
AC 14657	3 to 15 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4/3 moist) dark grayish brown (10YR 4/2 moist crushed) silt loam; very weak medium subangular blocky structure breaking to weak fine granular; dry slightly hard, moist very friable; violently effervescent; gradual smooth boundary.
C1 14658	15 to 42 inches. Pale brown (10YR 6.5/3 dry) to brown (10YR 5/3 moist and crushed) silt loam; very weak coarse subangular blocky to massive structure; dry soft, moist very friable; violently effervescent; clear smooth boundary.
C2	42 to 60 inches plus. Very pale brown (10YR 7/3 dry) to yellowish brown (10YR 5/4 moist and 5/3.5 moist crushed) silt loam; massive; dry soft, moist very friable; violently effervescent.

SCS-420 a
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Colby silt loam SOIL Nos. S60Colo-30-5 LOCATION Prowers County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14665-14669 January 1966

Depth (In.)	Horizon	1B1a Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	(2–0.1)	Clay 3A1a Carbonate	Clay 3A1a Non-Carbonate	Coarse fragments 2A2 ≥ 2 (<19) Pct.	Coarse fragments 2 – 19 Pct. of < 76 mm	Coarse fragments 19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0–2	A11	25.6	53.9	20.5	0.7a	1.6a	2.5a	6.1a	14.7a	38.7	15.2	56.7	10.9	–	20	Tr.		
2–7	A12	28.3	48.3	23.4	0.7a	2.9a	4.7a	9.9a	10.1a	30.3	18.0	45.1	18.2	Tr.	23	Tr.		
7–14	AC	17.8	56.9	25.3	0.3a	0.9a	1.3a	4.8a	10.5a	35.9	21.0	49.6	7.3	3	22	Tr.		
14–36	C1	10.1	62.8	27.1	0.1a	0.4a	0.7a	1.9a	7.0a	35.0	27.8	43.2	3.1	3	24	Tr.		
36–60	C2	22.4	53.2	24.4	1.0a	2.5a	2.7a	6.2a	9.8a	32.9	20.3	46.3	12.6	3	21	Tr.		

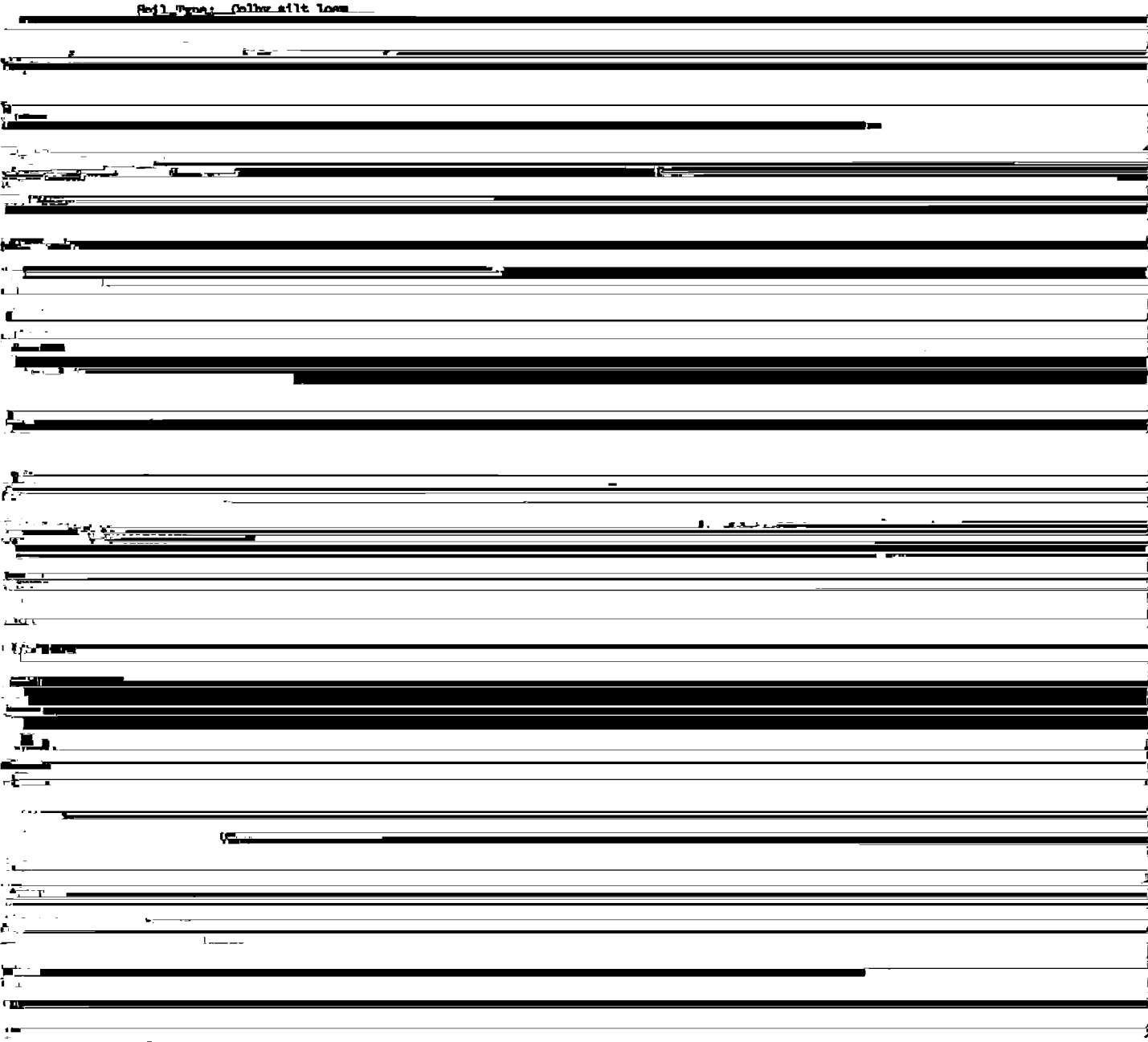
Depth (In.)	6A1a Organic carbon b/ Pct.	6B1a Nitrogen Pct.	C/N		6E1c Carbonate as $CaCO_3$ Pct.		Bulk density 4A1c 30-cm. g/cc	Bulk density 4A1b Air-Dry g/cc	4H1 COLE g/	Water content 4B3 30-cm. Pct.	Water content 4B1b 1/3-Bar Pct.	Water content 4B2 2-Bar Pct.	Water content 4B2 15-Bar Pct.	Water content 4C1 1/3-Bar to 15-Bar In./In.	pH 8C1b Sat. Paste	pH 8C1a 1:1	pH 8C1a 1:10
0–2	1.45	0.143	10		12								9.0		7.6	7.9	8.5
2–7	1.31	0.119	11		19			1.30	1.40	0.024	24.1	20.4	19.8	9.4	0.14	7.6	7.8	8.5
7–14	0.79	0.071	11		21			1.39	1.48	0.020	19.7	19.4	14.6	9.7	0.13	7.5	7.7	8.5
14–36	0.92	0.080	12		18									11.1		7.4	7.6	8.3
36–60	0.52				15									9.6		7.5	7.7	8.5

Depth (In.)	Extractable bases 5B1a Ca	Mg	6P2a Na	6Q2a K			Cat. Exch. Cap. 5A1a NH_4OAc	8A1 Ca	Mg	6P1a Na	6Q1a K		Water extract from saturated paste CO_3	HCO_3	Cl	SO_4	8A1a Electrical conductivity
	meq/100 g							meq/liter									mmho/cm
0–2			Tr.	2.5			16.3			0.7	2.4						0.9
2–7			Tr.	1.7			16.0			0.4	1.5						0.8
7–14			Tr.	1.3			15.0			0.9	1.2						1.1
14–36			0.1	0.8			17.6			0.7	0.5						1.5
36–60			0.1	0.6			14.9			0.8	0.3						1.3

Depth (In.)	8A Water at Saturation Pct.	5H2 Exchangeable Na Pct.		Gypsum Pct.	Ratios to Clay 8H1 NH_4OAc CEC	8H2 NH_4OAc CEC d/	8H1 15-Bar Water
0–2	48.0	<1			0.80	0.82	0.44
2–7	43.7	<1			0.68	0.70	0.40
7–14	46.8	<1			0.59	0.68	0.38
14–36	49.8	<1			0.65	0.73	0.41
36–60	44.4	1			0.61	0.71	0.39

a. 5–25% carbonate.
b. 13 kg/m² to 36 inches.
c. Coefficient of Linear Extensibility.
d. Noncarbonate clay.

Soil Type: Colby silt loam



Parent Material: Alluvium.
Physiographic Position: Stream terrace.
Relief: Nearly level, 0-1 percent slopes.
Drainage: Good.
Moisture: Moist to 15 inches, dry below.
Water Table: None.
Stoniness: None.
Salt or Alkali: None.
Erosion: None.
Present Use: Native range.
Described by: James P. Pannell, October, 1960.

Horizon and Lincoln Lab. No.	
A11 14665	0 to 2 inches. Light grayish brown (10YR 5.5/2 dry) to dark grayish brown (10YR 4/2 moist and crushed) silt loam; very weak very fine granular structure; dry soft, moist very friable; strongly effervescent; abrupt smooth boundary.
A12 14666	2 to 7 inches. Pale brown (10YR 5.5/3 dry) to brown (10YR 4/3 moist) dark grayish-brown (10YR 4/2 moist crushed) silt loam; weak medium subangular blocky structure breaking to weak fine granular; dry slightly hard, moist very friable; strongly effervescent; clear smooth boundary.
AC 14667	7 to 14 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4/3 moist and 4.5/3 moist crushed) silt loam;

SCS-420 a
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Colby silt loam SOIL Nos. 860Colo-50-6 LOCATION Prowers County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14670-14675 January 1966

Depth (In.)	Horizon	1B1a Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1 Clay: Carbonate	3Ala Clay: Non-Carbonate	Coarse fragments: 2A2 > 2 (<19) Pct.	Coarse fragments: 2 – 19 Pct. of < 76 mm	Coarse fragments: 19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0–1	A11	20.2	62.5	17.3	0.8a	1.8a	1.3b	3.6b	12.7b	42.8	19.7	57.9	7.5	-	17	Tr.		
1–7	A12	9.8	61.2	29.0	0.2a	0.4b	0.4b	1.5b	7.3b	37.8	23.4	46.2	2.5	5	24	Tr.		
7–14	AC	15.7	64.5	19.8	-	0.2b	0.3b	2.1b	13.1b	46.1	18.4	60.9	2.6	3	17	Tr.		
14–30	C1	31.0	54.0	15.0	-	-	0.3b	6.6b	24.1b	43.0	11.0	73.2	6.9	1	14	-		
30–40	C2	12.2	65.9	21.9	-	0.1b	0.2b	1.6b	10.3b	44.2	21.7	55.8	1.9	2	20	-		
40–60+	C3	38.4	44.1	17.5	1.6b	7.9b	7.4b	12.8b	8.7b	30.1	14.0	44.7	29.7	2	16	Tr.		

Depth (In.)	6Ala Organic carbon g/ Pct.	6B1a Nitrogen Pct.	C/N	6Ble Carbonate as $CaCO_3$ Pct.	Bulk density: 4A1c 30-cm. g/cc	Bulk density: 4A1b Air-Dry g/cc	4A1d COLE d/	Water content: 4B3 30-cm. Pct.	Water content: 4B1b 1/3-Bar Pct.	Water content: 4B2 2-Bar Pct.	4B2 15-Bar Pct.	4C1 1/3-Bar to 15-Bar in/in.	pH: 8C1b Sat. Paste	pH: 8C1a 1:1	pH: 8C1a 1:10
0–1	0.96	0.094	10	4							8.8		7.7	7.9	8.4
1–7	0.81	0.081	10	11	1.38	1.48	0.024	21.8	21.2	15.0	11.3	0.14	7.4	7.7	8.4
7–14	0.44	0.042	10	8	1.32	1.38	0.014	23.1	17.7	14.6	8.5	0.12	7.6	7.8	8.5
14–30	0.28	0.020	11	6							5.9		7.7	7.9	8.7
30–40	0.25			8							9.0		7.8	7.9	8.7
40–60+	0.23			8							7.2		7.9	8.1	8.7

Depth (In.)	Extractable bases: Ca	Mg	6P2a Na	6Q2a K	5B1a Cat. Exch. Cap.	5Ala NH_4OAc	8A1 Water extract from saturated paste: Ca	Mg	6P1a Na	6Q1a K	CO_3	HCO_3	Cl	SO_4	8Ala Electrical conductivity
	meq/100 g						meq/liter								mmho/cm
0–1			Tr.	1.2		17.4			0.4	0.5					0.8
1–7			Tr.	0.8		18.3			0.4	0.5					0.8
7–14			0.1	0.6		14.6			0.5	0.2					0.7
14–30			0.1	0.4		10.9			0.8	0.2					0.7
30–40			0.4	0.5		16.3			2.3	0.2					0.8
40–60+			0.6	0.4		12.4			4.3	0.1					1.0

Depth (In.)	8A Water at Saturation	5B2 Exchangeable Na	Gypsum	Ratios to Clay: 8B1 NH_4OAc CEC	Ratios to Clay: 8B2 NH_4OAc CEC	Ratios to Clay: 8B1 15-Bar

a. 5–25% carbonate. 25–50% organic matter.
b. 5–25% carbonate.
c. 4.3 kg/m² to 30 inches.
d. Coefficient of Linear Extensibility.

Soil Type: Colby silt loam
Soil Nos.: S60Colo-50-6
Location: 0.2 mile north and 0.25 mile east of the southwest corner, Sec. 12, T26S, R47W, Prowers County, Colorado.
Climate: Continental climate, average annual precipitation 13 to 15 inches, frost-free season 165 days.
Elevation: 4,000 feet.
Parent Material: Alluvium.
Physiographic Position: Stream terrace.
Relief: Nearly level 0-1 percent slopes.
Drainage: Good.
Moisture: Dry.
Water Table: None.
Stoniness: None.
Salt or Alkali: None.
Erosion: None.
Present Use: Native range.
Described by: James F. Pannell, October, 1960.

Horizon and Lincoln Lab. No.	
A11 14670	0 to 1 inch. Light grayish brown (10YR 5.5/2 dry) to dark grayish brown (10YR 3.5/2 moist and crushed) loam; weak fine platy structure breaking to weak very fine granular; dry soft, moist very friable; strongly effervescent; clear smooth boundary.
A12 14671	1 to 7 inches. Pale brown (10YR 5.5/3 dry) to dark brown (10YR 3.5/3 moist and 4/3 moist crushed) silt loam; moderate fine granular structure; dry slightly hard, moist very friable; strongly effervescent; clear smooth boundary.
AC 14672	7 to 14 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4.5/3 moist and crushed) silt loam; weak medium subangular blocky structure breaking to weak fine granular; dry slightly hard, moist very friable; violently effervescent; gradual smooth boundary.
C1	14 to 30 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4.5/3 moist and crushed) silt loam; very weak few small lime nodules; gradual smooth boundary.
C2 14674	30 to 40 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4/3 moist and 4.5/3 moist crushed) silt loam; massive; dry slightly hard, moist very friable; violently effervescent; gradual smooth boundary.
C3 14675	40 to 60 inches plus. Pale brown (10YR 6/3 dry) to brown (10YR 4.5/3 moist and 5/3 moist crushed) stratified silt loam, fine sandy loam and very fine sandy loam; massive; dry soft, moist very friable; violently effervescent.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Darling gravelly sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2735-2741

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									> 2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002		
4-0	Ao-Ao0											
0-4	A2	14.3	12.8	5.0	8.2	6.1	43.8	9.8	28.6	25.3		1

Soil Type: Darling gravelly sandy loam
Location: NW 1/4 of Sec. 8, T2S, R76W; Grand County, Colorado. West St. Louis Creek.
Physiographic Position: Upland
Topography: Steeply sloping mountain side facing north.
Drainage: Well drained.
Vegetation: Spruce - fir.
Use: Presently in National Forest Service lands.
Collected and Described by: John L. Retzer, September 5, 1952.

Horizon and Lincoln Lab. No.	
Ao - Aoo 2735	4 to 0 inch. Grayish brown (10YR 5/2 dry) to very dark gray (10YR 3/1 moist); a horizon of undecomposed and partially decayed forest litter made up of vaccinium roots, needles, twigs, and a few scattered leafy plants. The upper 1 inch is predominantly the undecomposed forest litter.
A2 2736	0 to 4 inches. Light gray (10YR 7/2 dry) to grayish brown or light brownish gray (10YR 5.5/2 moist) gravelly loam; soft when dry, very friable when moist; weak to moderate fine platy structure breaking to moderate fine granules; extremely acid, approximate pH 4.2; lower boundary clear and smooth.
B2 2737	4 to 14 inches. Brown (10YR 5/3 dry) to brown to dark brown (10YR 4/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure breaking to moderate very fine subangular blocks; extremely acid, approximate pH 4.2; lower boundary gradual and smooth.
B3 2738	14 to 30 inches. Yellowish brown (10YR 5/4 dry) to dark yellowish brown (10YR 4/4 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive or very weak medium subangular blocky structure; very strongly acid, approximate pH 4.8; lower boundary gradual and smooth.
C1 2739	30 to 52 inches. Light brownish gray (2.5Y 6/2 dry) to grayish brown (2.5Y 5/2 moist) gravelly sandy loam; hard when dry, friable when moist; massive; strongly acid, approximate pH 5.3; lower boundary gradual and smooth.
C2 2740	52 to 74 inches. Light yellowish brown (2.5Y 6/4 dry) to light olive brown (2.5Y 5/3 moist) very gravelly sandy loam; loose when dry or moist; single grain; very strongly or strongly acid, approximate pH 5.0; this horizon is partially weathered bedrock.
Dr 2741	74 to 94 inches. Fractured gneiss and schist only slightly altered by weathering.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Darling **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2742-2748

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	> 2	TEXTURAL CLASS
4-0	Ao-Aoo											
0-3	A2	8.8	7.9	4.0	6.7	5.3	52.1	15.2	30.6	30.2		sil
3-23	B2	12.2	14.5	7.6	13.7	8.8	30.0	13.2	29.1	16.7		cosl
23-38	B2	33.7	19.7	6.6	9.4	5.0	17.4	8.2	17.0	10.0		cosl
38-48	C1	39.6	21.2	6.5	8.4	4.3	15.9	4.1	14.6	9.6		lcos
48-81	C2	14.8	16.7	10.1	20.2	11.7	22.4	4.1	33.8	11.1		cosl
81-116+	D	24.9	21.7	9.0	14.3	7.2	16.4	6.5	21.5	9.1		lcos

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N
4.7			3.83	.154	25
4.8			1.35	.062	22
5.2			1.00	.043	23
5.5			0.47		
5.8			0.31		
5.9			0.27		

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	Base Sat. % on Sum Cations 5C3	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg
← milliequivalents per 100g. soil →								me/100g	me/100g	
28.9	5.2	2.6	19.3	0.1	0.9	30	31	8.8	28.1	2.0
20.6	6.9	1.2	14.1	0.1	0.4	42	38	8.6	22.7	5.8
13.1	5.0	0.6	10.6	0.1	0.3	46	36	6.0	16.6	
10.3	4.3	0.6	6.8	0.1	0.2	50	43	5.2	12.0	
14.4	10.0	1.4	3.7	0.1	0.3	82	76	11.8	15.5	7.1
13.9	10.6	1.3	3.9	0.1	0.3	88	76	12.3	16.2	8.2

Soil Type: Darling gravelly sandy loam
Location: NW 1/4 of Sec. 8, T2S, R76W, Grand County, Colorado. West St. Louis Creek.
Physiographic Position: Upland steep mountain slope.
Topography: Steeply sloping area of approximately 35 percent gradient facing north.
Drainage: Well drained.
Vegetation: Spruce - fir.
Use: National Forest Service land.
Collected and Described by: John L. Retzer, September 8, 1955.

Horizon and Lincoln Lab. No.	
Ao - Aoo 2742	4 to 0 inch. Dark-colored organic mat made up of undecomposed and partially decomposed forest litter, primarily vaccinium roots, needles, bark, and twigs.
A2 2743	0 to 3 inches. Light brownish gray (10YR 6/2 dry) to grayish brown (10YR 5/2 moist) gravelly loam; soft when dry, very friable when moist; weak to moderate medium platy structure; extremely acid, approximate pH 4.4; lower boundary abrupt and smooth.
B2 2744	3 to 23 inches. Brown (7.5YR 5/4 dry) to brown to dark brown (7.5YR 4/4 moist) very gravelly sandy loam; loose when dry and moist; single grained; very strongly acid, approximate pH 4.7; approximately 75 percent of this horizon is gravel; lower boundary gradual and smooth.
B2 2745	23 to 38 inches. Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) gravelly sandy loam; very hard when dry, firm when moist; massive; strongly acid, approximate pH 5.2; this horizon is weakly cemented in some places, but the degree of cementation is not great and is variable from place to place; lower boundary gradual and smooth.
C1 2746	38 to 48 inches. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) very gravelly sandy loam; slightly hard when dry, very friable when moist; massive; strongly acid, approximate pH 5.5; lower boundary diffuse and smooth.
C2 2747	48 to 81 inches. Light olive brown (2.5Y 5/3 dry) to olive brown (2.5Y 4/3 moist) partially weathered gneiss and schist bedrock. Approximately 70 percent of the horizon is coarse stones and boulders with the remainder of the horizon being a very gravelly sandy loam occurring between the boulders. Lower boundary diffuse and smooth.
D 2748	81 to 116 inches plus. Light olive brown (2.5Y 5/3 dry) to olive brown (2.5Y 4/3 moist) unweathered fresh gneiss and schist bedrock.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Darling gravelly sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2791-2794

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	> 2	TEXTURAL CLASS
0-6	Ao& A2											
6-21	B2	49.7	15.9	3.4	4.9	5.1	16.0	5.0	14.4	9.6		lcos
21-34	B3	28.4	13.5	5.3	10.1	13.8	27.2	1.7	34.6	12.6		cosl
34-47	C	17.4	14.1	8.5	14.7	15.1	27.2	3.0	41.8	9.3		cosl

pH			ORGANIC MATTER		
8C1a 1:1	1:5	1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N
4.9			0.62	.015	41
5.0			0.60	.031	19
5.3			0.21	.015	

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	Base Sat. % on Sum Cations 5C3	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg
← milliequivalents per 100g. soil →								me/100g	me/100g	
10.9	5.1	1.7	11.3	0.1	0.1	64	38	7.0	18.3	3.0
11.8	0.6	0.2	12.2	0.1	0.1	8	8	1.0	13.2	
16.2	4.6	1.2	9.1	0.1	0.2	38	40	6.1	15.2	3.8

Soil Type: Darling gravelly sandy loam
Location: SW 1/4 of Sec. 10, T2S, R76W, Grand County, Colorado, along Road 9, Fool Creek Watershed.
Physiographic Position: Upland.
Topography: Steeply sloping slightly concave mountain slope, facing north.
Drainage: Well or moderately well drained.
Vegetation: Spruce and fir.
Use: National Forest Service land.
Collected and Described by: John L. Retzer, October 3, 1952.

Horizon and Lincoln Lab. No.	
Ao & A2 2791	0 to 6 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) gravelly sandy loam; soft when dry, very friable when moist; weak to moderate fine granular structure; extremely acid, approximate pH 4.2; this horizon appears to be a mixture of Ao and A2. At the site sampled, portions of the pit indicated a weak A2 in the lower inch while other portions seemed to indicate that the A2 had been mixed throughout the entire horizon since small fragments of mineral matter approximately 10YR 7/2 dry and 10YR 5/2 moist occurred heterogeneously throughout the mass.
B2 2792	6 to 21 inches. Brown (7.5YR 5/3 dry) to brown or dark brown (7.5YR 4/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; weak to moderate subangular blocky structure; strongly acid, approximate pH 5.1; lower boundary gradual and smooth.
B3 2793	21 to 34 inches. Light yellowish brown (10YR 6/4 dry) to dark yellowish brown (10YR 4/4 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; strongly acid, approximate pH 5.2; lower boundary gradual and smooth.
C 2794	34 to 47 inches. Light yellowish brown (2.5Y 6/4 dry) to light olive brown (2.5Y 5/4 moist) gravelly sandy loam; very hard when dry, very firm when moist; massive; strongly acid, approximate pH 5.5; 80 to 90 percent of this horizon is gravel and rock, and the horizon appears to be weakly cemented; lower boundary is diffuse and smooth.
D	47 to 55 inches. Partially weathered gneiss and schist bedrocks.

Remarks: This profile is thought to be a Darling soil occurring in a slightly concave area where it has received some mixture and truncation, so that the distinct A2 of the Darling soils occurs indefinitely or may be absent entirely. These areas in the Fraser Unit were of small acreage and were combined as an inclusion in the Darling series. It is possible that soils of this character will need series status if they are found to occur frequently and in large areas.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Darling gravelly sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2795-2799

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) 3A1										TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
3-0	Aoo											
0-10	Ac&A2	9.4	6.6	3.8	9.0	10.9	41.5	18.8	34.5	23.5		l
10-22	B2	18.8	11.0	6.0	12.1	13.5	32.2	6.4	37.5	15.6		cosl
22-42	B3	22.9	12.7	6.8	11.8	11.5	27.8	6.5	34.3	12.1		cosl
42-54	C1	38.0	17.4	7.9	10.5	7.0	14.0	5.2	20.4	6.2		lcos

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N
4.9			7.22	.398	18
5.6			0.54	.046	12
5.8			0.28	.020	14
5.9			0.23		

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	Base Sat. % on Sum Cations 5C3	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg
← milliequivalents per 100g. soil →								me/100g	me/100g	
35.9	17.0	4.7	28.4	0.1	0.4	62	44	22.2	50.6	3.6
11.1	6.7	1.5	4.6	0.1	0.1	76	65	8.4	13.0	4.5
8.2	4.9	1.2	4.4	0.1	0.1	77	59	6.3	10.7	4.1
7.3	4.3	1.2	2.8	0.1	0.1	78	67	5.7	8.5	3.6

Soil Type: Darling gravelly sandy loam
Location: SW 1/4 of Sec. 10, T2S, R76W, Grand County, Colorado, along Road 9, Fool Creek Watershed.
Physiographic Position: Upland.
Topography: Steeply sloping slightly concave mountain side, facing north.
Drainage: Moderately or well drained.
Vegetation: Spruce and fir.
Use: National Forest Service land.
Collected and Described by: John L. Retzer, October 3, 1952.

Horizon and Lincoln Lab. No.	
Aoo 2795	3 to 0 inch. A forest mat of undecomposed moss, vaccinium, needles, bark and twigs.
Ao & A2 2796	0 to 10 inches. Dark gray (10YR 4/1 dry) to very dark gray (10YR 3/1 moist) gravelly loam; soft when dry, very friable when moist; moderate fine granular structure; very strongly acid, approximate pH 5.0; this horizon appears to be a mixture of Ao and A2. In places a thin A2 horizon in (10YR 7/2 dry) and (10YR 5/2 moist) occurs intermittently in the lower 2 inches of the horizon described. In other areas flecks and nodules of A2-like material (10YR 7/2 dry) and (10YR 5/2 moist) occur throughout the entire horizon.
B2 2797	10 to 22 inches. Brown (7.5YR 5/4 dry) to brown or dark brown (7.5YR 4/4 moist) gravelly loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure; medium acid, approximate pH 5.6; lower boundary gradual and smooth.
B3 2798	22 to 42 inches. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; medium acid, approximate pH 5.8; lower boundary gradual and smooth.
C1 2799	42 to 54 inches. Light yellowish brown (2.5Y 6/3 dry) to olive brown (2.5Y 4/4 moist) gravelly sandy loam; hard when dry, firm when moist; massive; medium acid, approximate pH 5.8; lower boundary gradual and smooth.
C2	54 to 57 inches. This is a stratified layer and contains a large amount of coarse gravel and rock.
D	57 inches plus. Light brownish gray (2.5Y 6/2 dry) to grayish brown (2.5Y 5/2 moist) partially weathered gneiss and schist bedrock.

SCS-420
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Deertrail silt loam SOIL Nos. S61Colo-3-4 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 15508-15516 February 1965

Depth (in.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05) 1B1a	Total: Silt (0.05–0.002) 1B1a	Total: Clay (< 0.002) 1B1a	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Clay: Carbonate	3A1a Clay: Noncarbonate	Coarse fragments 2A2: > 2	Coarse fragments 2A2: 2 – 19	Coarse fragments 2A2: 19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0-2	A2	14.4	54.5	31.1	-	0.2b	0.2	1.8	12.2	33.0	21.5	46.5	2.2		31	Tr.		
2-9	B2t	10.7	49.1	40.2	-	0.1b	0.1	1.5	9.0	26.6	22.5	36.7	1.7	-	40	Tr.		
9-12	B2ca	11.1	49.6	39.3	-	0.1b	0.1	1.0	9.9	27.8	21.8	38.4	1.2	1	38	Tr.		
12-23	B31ca	11.0	54.9	34.1	-	0.1c	0.1c	0.8c	10.0c	30.5	24.4	41.1	1.0	4	30	Tr.		
23-32	B32ca	11.5	58.1	30.4	-	0.1d	0.1d	0.9e	10.4e	33.2	24.9	44.3	1.1	5	25	Tr.		
32-44	C1	12.9	61.1	26.0	-	0.1d	0.1d	0.8e	11.9e	36.0	25.1	48.5	1.0	3	23	-		
44-55	C2	13.2	60.3	26.5	-	0.1d	0.2d	0.9e	12.0e	34.4	25.9	47.1	1.2	1	22	-		
55-69	C3cs	14.2	62.0	23.8	-	0.1d	0.1d	1.6e	12.4e	34.6	27.4	48.2	1.8	Tr.	24	Tr.		
a		11.7	47.1	41.2		0.1	0.1	1.7	9.8	28.7	18.4	39.8	1.9		41	-		

Depth (in.)	6A1a Organic carbon	6B1a Nitrogen	6A1a C/N		6E1c Carbonate as $CaCO_3$	6C1a Ext. Iron as Fe	Bulk density 4A1c 30-Cm.	Bulk density 4A1b Air-Dry	4B1 COLE f	Water content 4B3 30-Cm.	Water content	Water content 4B2 15-Bar		4D1 15-Bar Water to Clay Ratio	pH 8C1b Sat. Paste	pH 8C1a 1:10	pH 8C1a (1:1)
	Pct.	Pct.			Pct.	Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.					
0-2	1.28	0.105	12			0.7						12.2		0.39	6.3	6.9	6.5
2-9	0.69	0.071	10		Tr.	0.8		1.32	1.58	0.39	32.9	15.6		0.39	6.7	7.3	6.9
9-12	0.60	0.062	10		6	0.7						15.6		0.40	7.7	8.5	7.8
12-23	0.30	0.038	8		11	0.6			1.59			14.2		0.42	8.1	9.0	8.3
23-32	0.18	0.025			10	0.6						13.2		0.43	7.9	8.9	8.2
32-44	0.17				7	0.6						12.1		0.46	7.7	8.8	8.1
44-55	0.17				6	0.6			1.42			12.4		0.47	7.8	8.9	8.1
55-69	0.17				5	0.7						12.2		0.51	7.6	8.1	7.7
a	1.06				-	0.9						16.0		0.39			

Depth (in.)	Extractable bases 5B1a: 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap.: 5A3a Sum Cations	5A1a NH_4OAc	5A2a NaOAc	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	6L1a SO_4	8A1a Electrical conductivity
	meq/100 g									meq/liter								mmho/cm
0-2	12.0	5.7	0.1	1.3	19.1	3.8	22.9	19.7	20.4			0.4	0.4					0.40
2-9	15.5	9.2	0.3	1.4	26.4	2.9	29.3	25.6	26.0			0.9	0.3					0.50
9-12			0.7	1.2				25.4	26.3			2.0	0.3					0.70
12-23			2.2	0.9				22.3	23.7			4.4	0.1					0.62
23-32			3.0	1.0				21.3	22.3	3.4	2.0	12.7	0.3	-	4.0	-	17.6	1.9
32-44			4.4	1.1				20.8	21.6	14.7	11.3	34.9	0.7	-	4.6	-	64.9	4.9
44-55			5.8	1.2				21.4	22.2	12.7	9.4	41.5	0.7	-	6.8	1.7	67.1	5.6
55-69			5.1	1.1				21.5	22.4	24.5	14.7	46.8	0.8	-	5.8	10.8	80.0	6.8
a	13.0	8.3	1.7	1.4	24.4	5.0	29.4	25.3	26.6									

Depth (in.)	8A Water at Saturation	5D1 Exchangeable Na $NaOAc$ CEC	5E Sodium Adsorption Ratio	6F1a Gypsum	8D1 NH_4OAc CEC to Clay Ratio	Base Sat. 5C3 Sum Cations	Base Sat. 5C1 NH_4OAc
	Pct.	Pct.		Pct.			
0-2	52.5				0.63	83	97
2-9	56.5	1			0.64	90	103
9-12	65.5	2			0.65		
12-23	59.8	8			0.65		
23-32	45.7	11	8		0.70		
32-44	44.7	13	10	-	0.80		
44-55	44.5	18	12	-	0.81		
55-69	43.3	12	10	0.9	0.90		
a					0.61	83	96

a. Upper inch of B2 having A2-like characteristics.
b. > 50% organic matter.
c. 5-25% carbonate.
d. 25-50% mica-like.
e. 5-25% carbonate. < 5% mica-like.
f. Coefficient of linear extensibility.

Soil Type: *Deertrail silt loam
Soil Nos.: S61Colo-3-4
Classification: Brown.
Location: 521 feet east, 252 feet north of the southwest corner of Sec. 23, T5S, R59W, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation 14 inches. Mean annual temperature 49° F. Frost-free period 150 days. Elevation 5,400 feet.
Vegetation: Native pasture. Barren. Buffalograss and western wheatgrass on the edge. Associated with Weld silt loam growing blue grama and pricklypear.
Parent material: Aeolian silty material - loess.
Physiographic position: Upland.
Relief: Small depression, about 10 feet in diameter, and 4 inches lower than surrounding ground. Overall slope is nearly level, 1 percent facing north and east.
Drainage: Slow surface drainage. Water will stand in these spots a day or more. Medium to slow internal drainage in B2, medium in other horizons. Slow intake rate.
Moisture: Moist to 14 inches, dry below. Usually dry. Water table: None. Stoniness: None.
Salt or alkali: Typical for B3ca to have a pH of over 8.5, but pH of 7.5 or lower in A2 and B2. Calcium carbonate present below B2 horizon.
Erosion: Slight wind. May be removal or deposition.
Described by: J. B. Brown, June 27, 1961.

Horizon and Lincoln Lab. Nos.	
A2 15508	0 to 2 inches. Dark grayish brown (10YR 4/2, moist) heavy silt loam; light brownish gray (10YR 6/2, dry) strong fine granular structure; soft when dry, very friable when moist; texture grades from silt loam to silty clay loam; the bottom 1/4 to 1/2 inch of this horizon has strong, very fine platy structure;
B2t 15509	2 to 9 inches. Dark brown (10YR 3.5/3, moist) clay; dark brown (10YR 4/3, dry) dark brown (10YR 4/3, moist and crushed); moderate medium prisms breaking to strong fine angular blocks; very hard when dry, very firm when moist; thin nearly continuous clay skins on all ped surfaces; columns are coated with fine bleached sand grains; roots are plentiful in this horizon, with as many penetrating the peds as following the structural faces; top two inches of this horizon has a little darker staining on the outside of the peds than the lower part of the horizon; abrupt slightly wavy boundary.
B2ca 15510	9 to 12 inches. Brown (10YR 4.5/3, moist) silty clay; pale brown (10YR 6/3, dry) moderate medium prisms breaking to moderate fine angular blocks; hard when dry, firm when moist; thin patchy clay films on all ped faces; roots and root channels are numerous in this horizon; strong effervescence; clear smooth boundary.
B31ca 15511	12 to 23 inches. Brown (10YR 5/3, moist) silty clay loam; pale brown (10YR 6.5/3, dry) moderate medium prisms breaking to moderate fine angular and subangular blocks; hard when dry, firm when moist; thin patchy clay films on ped surfaces; roots are numerous with many fine pores one millimeter in diameter; lime concretions are common medium and faint; violent effervescence; clear smooth boundary.
B32ca 15512	23 to 32 inches. Brown (10YR 5/3, moist) light silty clay loam; pale brown (10YR 6/3, dry) weak medium prisms breaking to weak to moderate medium subangular blocks; slightly hard when dry, friable when moist; thin patchy clay films on some ped faces; lime concretions are few medium and faint; some roots and many small pores less than one millimeter in diameter; violent effervescence; gradual smooth boundary.
C1 15513	32 to 44 inches. Brown (10YR 5/3, moist) silt loam; pale brown (10YR 6/3, dry) weak coarse prismatic to massive structure; soft when dry, very friable when moist; few roots with many small holes less than one millimeter in diameter; violent effervescence; arbitrary boundary.
C2 15514	44 to 55 inches. Brown (10YR 5/3, moist) silt loam; pale brown (10YR 6/3, dry) weak coarse prismatic to massive structure; soft when dry, very friable when moist; very few roots but pores continue; violent effervescence; clear slightly wavy boundary.
C3ca	55 to 69 inches. Brown (10YR 5.5/3, moist) silt loam; pale brown (10YR 6.5/3, dry) massive structure;

SCS-420
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Deertrail silt loam SOIL Nos. S61Colo-3-6 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 15525-15532 February 1965

Depth	Horizon	1B1a Total Sand	Total Silt	Total Clay	Sand Very	Sand Coarse	Sand Medium	Sand Fine	Sand Very fine	Silt	Silt Int. III	Int. II (0.2-0.02)	(2-0.1)	3A1a Clay		Coarse fragments 2A2 >2	2 - 19	19-76
0-3	A2	19.3	52.9	27.8	0.1a	0.2a	0.3	2.1	16.6	35.2	17.7	53.3	2.7			28	Tr.	
3-10	B2t	13.1	42.7	44.2	-	0.2	0.2	1.7	11.0	24.6	18.1	36.9	2.1	-		44	Tr.	
10-13	B2ca	14.3	46.5	39.2	-	0.1b	0.1b	1.6b	12.5b	27.3	19.2	41.1	1.8	4		35	Tr.	

Soil Type: *Deertrail silt loam
Soil Nos.: S61Colo-3-6
Classification: Brown
Location: 144 feet west, 303 feet south of the northeast corner of Sec. 16, T4S, R59W, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation 14 inches. Mean annual temperature 49° F. Frost-free period 150 days. Elevation 5,100 feet.
Vegetation: Native pasture. Buffalograss associated with blue grama, western wheatgrass and pricklypear.
Parent material: Aeolian silty material. Physiographic position: Upland.
Relief: Small depression about 7 feet in diameter, and 4 inches lower than surrounding area. Over-all slope is nearly level, 1 percent facing northeast.
Drainage: Surface drainage slow to none. Water will stand in these spots a day or more. Slow to medium internal in the B2, medium in other horizons. Slow intake rate.
Moisture: Moist to 12 inches. Dry below. Usually dry. Water table: None. Stoniness: None.
Salt or alkali: Typical for B3ca to have a pH of over 8.5, with pH of 7.5 or lower in A2 and B2. Calcium carbonate present below B2 horizon.
Erosion: Slight wind. May be removal or deposition. Described by: J. B. Brown, June 28, 1961.

Horizon and Lincoln Lab. No.

A2 15525 — 0 to 3 inches. Dark grayish brown (10YR 4/2, moist) heavy silt loam; light brownish gray (10YR 6/2, dry) strong very fine granular structure; soft when dry, very friable when moist; this horizon grades from a silt loam to a silty clay loam; the botton 1/4 to 1/2 inch has strong very fine platy structure coating the tops of the columns of the B2; field pH 6.8; boundary abrupt and smooth.

B2t 15526 — 3 to 10 inches. Dark brown (10YR 3.5/3, moist) clay; dark brown (10YR 4/3, dry, moist and crushed) moderate medium columns breaking to strong fine angular blocks; very hard when dry, very firm when moist; thin continuous clay films on ped surfaces; top 2 inches have darker staining on outside of peds; columns are coated with bleached fine sand grains; roots are numerous and readily penetrate the peds; field pH 7.6; abrupt slightly wavy boundary.

B2ca 15527 — 10 to 13 inches. Brown (10YR 4.5/3, moist) silty clay; brown (10YR 5/3, dry) moderate medium prisms breaking to moderate to strong fine angular blocks; hard when dry, firm when moist; thin patchy clay skins on all peds; many roots readily penetrate the peds; strong effervescence; with field pH of 8.6; clear smooth boundary.

B31ca 15528 — 13 to 20 inches. Light olive brown (1Y 5/3, moist) silty clay loam; light yellowish brown (1Y 6/3, dry) moderate medium prisms breaking to moderate medium subangular and angular blocks; hard when dry, friable when moist; thin patchy clay films on vertical faces; many roots readily penetrate peds; small holes less than one millimeter in diameter are common; lime concretions are common medium and faint; violent effervescence; field pH 9.0; gradual smooth boundary.

B32ca 15529 — 20 to 29 inches. Light olive brown (1Y 5/3, moist) light silty clay loam; light yellowish brown (1Y 6/3, dry) weak medium prismatic breaking to weak medium subangular blocks; hard when dry, friable when moist; few thin clay skins on some vertical faces; roots are plentiful, with many fine pores less than one millimeter in diameter; lime concretions are few medium and faint; violent effervescence; gradual smooth boundary.

C1 15530 — 29 to 40 inches. Light olive brown (1Y 5/3, moist) heavy silt loam; light yellowish brown (1Y 6/3, dry) weak coarse prismatic structure; slightly hard when dry, friable when moist; some roots and many small holes less than one millimeter in diameter; some lime mycelia; violent effervescence; diffuse boundary.

C2 15531 — 40 to 55 inches. Light olive brown (1Y 5/3, moist) silt loam; light yellowish brown (1Y 6/3, dry) massive; soft when dry, very friable when moist; very few roots, but many holes less than one millimeter in diameter; violent effervescence; arbitrary boundary.

C3 15532 — 55 to 68 inches. Light olive brown (1Y 5/3, moist) silty loam; light yellowish brown (1Y 6/3, dry) massive; soft when dry, very friable when moist; no roots, but small holes continue; violent effervescence.

Remarks: This soil is associated with the Weld series and grades from this to the Weld. These spots are usually small, less than 100 feet in diameter. They are common on slopes of 0 to 3 percent and are found at the heads of drainages on slopes of 3 to 5 percent. Where cultivated, the crops are lower in height and lower in yields where these spots have been. They will show as slicked-over areas in cultivated fields. They seldom cover more than 30 percent of the area, with yields being 5 to 20 percent less where these spots are present, as compared to the Weld series alone. Columns in the B2 often lean 10 to 30 degrees, but none have been found that are horizontal. They may lean in any direction.

Bureau of Public Roads Samples: B2, 3-10 inches; B32ca, 20-29 inches; C2, 40-55 inches.

EXCHANGE CAPACITY OF NONCLAY

Identification		Silt (50-4μ)		Sand		Total
		me./100 g.	Per 100 g./<2-mm.	me./100 g.	Per 100 g./<2-mm.	me./100 g.
15526	B2	7.2	3.1	2.1	0.3	3.4
15531	C2	4.0	2.5	4.7	0.8	3.3

Observations of fabric with stereoscopic microscope: B2 has very weak coatings on planar surfaces. A few clay films associated with pores of ped interiors. Slightly denser and shinier planar surfaces than B2 of 3-4. Strucutre weaker than B2 of Weld.

Micromorphology (Method 4E1): Examined B2 and B2ca. Most macro surfaces have little or no associated preferred orientation. A very few clay films occur. The B2 has slightly weaker clay orientation than B2ca. Markedly fewer clay and pressure films than in the B2 of Weld 3-3.

Clay Mineralogy (Method 7A): The dominant mineral in the clay fraction in all horizons is montmorillonite. In the A horizon and noncalcareous B horizon this mineral is somewhat disordered, partly weathered, or contains interlayered mineral as indicated by diffuse, broadened X-ray reflections. These horizons also contain slightly more mica and kaolin than the calcareous horizons. The montmorillonite in the calcareous B and C horizons gives very strong sharp X-ray reflections indicating regular crystallinity as well as large amounts.

Sand mineralogy (Method 7E1): Deertrail has an increase in mica with depth.

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Edloe gravelly sandy loam **LOCATION** Trout Creek Watershed, Chaffee County, Colorado

SOIL NOS. S57Colo-8-1 **LAB. NOS.** 8172-8178

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	3A1 0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
½-0	A°, A°°										29	
0-1½	A1	16.4	15.5	8.8	13.8a	9.8a	29.6	6.1	34.4	11.8	40.	cosl
1½-8	A2	19.9	17.6	10.0	14.9a	11.4a	20.9	5.3	30.9	8.7	35.	cosl
8-19	B1	24.7	18.8	9.5	13.7a	9.5a	15.1	8.7	25.8	5.3	61.	cosl
19-29	B2t	17.3	18.3	9.2	14.4a	11.4a	16.1	13.3	29.1	5.6	38	cosl
29-33	B3	17.0	31.0	12.7	17.9a	6.5a	5.3	9.6	17.2	2.4	52	lcos
33-45+	C	9.2	31.7	13.6	22.4a	8.2a	5.0	9.9	21.4	2.0	57	lcos

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6C1a Free Iron Fe_2O_3%		6E1a $CaCO_3$ equivalent %		MOISTURE TENSIONS 4B1a 1/10 ATMOS. %	4B1a 1/3 ATMOS. %	4B2 15 ATMOS. %
6.7			2.16	0.098	22	1.0		<1		24.5	12.1	3.9
6.3			0.91	0.042	22	1.0				19.3	9.3	3.1
6.6			0.25	0.014	18	1.1		<1		13.9	7.4	3.6
6.4			0.17	0.011		1.2				17.2	10.0	4.8
6.8			0.10			1.2		<1		10.8	7.2	3.8
6.7			0.09			1.1		<1		8.9	7.6	4.1

5A1a CATION	EXTRACTABLE CATIONS 6N2b	6O2b	6H1a	6P2a	6Q2a	BASE SAT. %	5C3 Base	Sum Bases	Sum Cations	Ca/Mg

Soil Type: Edloe gravelly sandy loam
Soil Nos.: S57Colo-8-1
Location: Trout Creek Watershed, Chaffee County, Colorado.
Physiographic Position: Mountain side. Elevation 9,730 feet.
Topography: Steeply sloping north face approximately 40 percent gradient.
Drainage: Well drained.
Vegetation: Spruce, fir, with only a small amount of understory brush and grass.
Use: National Forest lands.
Collected by: John Retzer, A. J. Cline, E. M. Payne, T. Baber, W. Hunter and P. Wesswick, September 18, 1957.
Described by: A. J. Cline.

Horizon and Lincoln Lab. No.	
Ao, Aoo 8172	½ to 0 inch. Organic horizons too thin to be sampled separately, consisting mainly of undecomposed forest debris of branches, bark, and evergreen needles, but with a very thin partially decomposed horizon at its base.
A1 8173	0 to 1½ inches. Gray (10YR 5/1 dry) to very dark grayish brown (10YR 3/2 moist) gravelly sandy loam; soft when dry, very friable when moist; weak very fine platy structure, breaking to moderate fine crumb; noncalcareous, approximate pH 6.8; lower boundary clear and wavy.
A2 8174	1½ to 8 inches. Light brownish gray (10YR 6.5/2 dry) to grayish brown (10YR 5.5/2 moist) gravelly loamy sand; soft when dry, very friable when moist; weak fine platy structure, breaking to moderate medium crumb; noncalcareous, approximate pH 6.8; this horizon is very vesicular and contains many medium-sized pores; about 40 percent of the horizon is gravel; lower boundary gradual and wavy.
B1 8175	8 to 19 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) stony sandy loam; soft when dry, very friable when moist; weak to moderate fine subangular blocky structure; noncalcareous, approximate pH 6.6; this horizon contains aggregates of material similar to those of the underlying horizon but which are completely enclosed and surrounded by light-colored material similar to that of the overlying horizon. Some of the aggregates in this horizon have thick continuous clay skins and in some parts of the horizon thick gelatinous seams of bright-colored clay-like material occur between the rocks and in natural cleavage plains; about 50 percent of this horizon is stone and gravel; lower boundary gradual and wavy.
B2t 8176	19 to 29 inches. Light brown (7.5YR 5.5/3 dry) to brown (7.5YR 5/4 moist) stony sandy clay loam; hard when dry, friable when moist; moderate medium subangular blocky structure; noncalcareous, approximate pH 6.6; there are thick continuous clay skins on the surfaces of the soil aggregates; 40 percent of this horizon is gravel and stone; lower boundary gradual and smooth.
B3 8177	29 to 33 inches. Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 moist) stony loamy sand; slightly hard when dry, very friable when moist; weak medium granular structure to single grain; noncalcareous, approximate pH 6.6; there are a few thin clay skins on the soil aggregates and coating the surfaces of the rock fragments; about 40 percent of this horizon is gravel and stone; lower boundary gradual and smooth.
C 8178	33 to 45 inches plus. Brown (10YR 5/3 dry) to dark brown (10YR 3/3 moist) stony sand and gravel. This horizon is principally disintegrated granite and biotite schist; its pH is approximately 6.6.

Remarks: Profile downslope in position from Edloe, Soil Nos. S57Colo-8-2.

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Edloe gravelly sandy loam **LOCATION** Trout Creek Watershed, Chaffee County, Colorado

SOIL NOS. S57Colo-8-2 **LAB. NOS.** 8179-8183

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	3A1 0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-2	A1	22.2	15.5	6.0	5.2a	10.1a	32.5	8.5	28.5	14.9	47	cosl
2-8	A2	25.9	20.4	8.8	11.3a	7.7a	20.6	5.3	25.0	8.6	49	cosl
8-13	B1	30.1	24.5	9.7	11.9a	5.7a	12.4	5.7	17.9	5.7	47	lcos
13-18	B2t	27.8	23.7	9.4	10.6a	7.7a	14.2	6.6	19.3	6.6	54	lcos
18-34+	Cr	15.0	28.7	13.0	20.8a	7.6a	8.6	6.3	21.8	4.6	58	lcos

	pH		ORGANIC MATTER			6C1a		6E1a		MOISTURE TENSIONS		
8C1a			6A1a	6B1a		Free Iron		$CaCO_3$ equivalent		4B1a 1/10 ATMOS.	1/3 ATMOS.	4B2 15 ATMOS.
1:1	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N	Fe_2O_3 %		%		%	%	%
6.5			0.47	0.183	9/1	0.0		0				6.1

Soil Type: Biloe gravelly sandy loam
Soil Nos.: S57Colo-8-2
Location: Trout Creek Watershed, Chaffee County, Colorado.
Physiographic Position: Mountain side. Elevation 9,855 feet.
Topography: Steeply sloping north-facing mountain slope, approximate gradient 42 percent.
Drainage: Well drained.
Vegetation: Aspen, fir, spruce and Kinikinick.
Use: National Forest Service lands.
Collected by: John Retzer, A. J. Cline, E. M. Payne, T. Baber, W. Hunter, and E. Wesswick, September 18, 1957.
Described by: A. J. Cline.

Horizon and
Lincoln
Lab. No.

Ao, Aoo — 1 to 0 inch. This is a thin organic mat made up mostly of undecomposed pine needles, leaves, and grass remains, but having its lower portion moderately well decomposed. It rests abruptly on the horizon below.

A1
8179 — 0 to 2 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) gravelly sandy loam; soft when dry, very friable when moist; moderate fine crumb structure; noncalcareous; about 25 percent of this horizon is gravel; lower boundary abrupt and smooth.

A2
8180 — 2 to 8 inches. Light gray (10YR 7/2 dry) to grayish brown (10YR 5/2 moist) gravelly loamy sand; soft when dry, very friable when moist; weak fine platy structure breaking to moderate fine crumbs; noncalcareous; there are common numbers of small distinct 10YR 5/4 mottles; about 40 percent of this horizon is gravel; lower boundary gradual and wavy.

B1
8181 — 8 to 13 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) gravelly loamy sand or gravelly sandy loam; soft when dry, very friable when moist; weak medium subangular blocky structure, breaking to moderate fine granular; noncalcareous; this horizon contains some aggregates similar in character to those of the horizon below but these are imbedded in light-colored material similar to that of the overlying horizon; there are a few thin continuous clay skins on some of the soil aggregates, and in some portions of the horizon seams of clay-like material are visible; about 40 percent of the horizon is gravel; lower boundary gradual and wavy.

B2t
8182 — 13 to 18 inches. Pale brown (10YR 6/3 dry) to brown or dark brown (10YR 4/3 moist) stony sandy clay loam; hard when dry, friable when moist; moderate medium subangular blocky structure; noncalcareous; there are thin nearly continuous clay skins on the surfaces of the soil aggregates in this horizon; approximately 65 percent of the horizon is stone and gravel; the lower is diffuse and irregular; some gray coating material occurs on the surface of the soil aggregates in this horizon.

Cr
8183 — 18 to 34 inches plus. This horizon is mainly weathered granite and biotite schist. The material is partially indurated but usually can be broken between the thumb and finger. Its consistence increases with depth.

Remarks: Profile intermediate in position on slope between Biloe profiles, Soil Nos. S57Colo-8-1 and S57Colo-8-3.

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Edloe gravelly sandy loam **LOCATION** Trout Creek Watershed, Chaffee County, Colorado

SOIL NOS. S57Colo-8-3 **LAB. NOS.** 8184-8188

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-1	A1	20.3	14.6	6.8	10.5a	8.3a	31.5	8.0	30.1	14.7	40	cosl
1-3	A21	18.6	16.4	7.9	9.9a	10.6a	29.2	7.4	28.9	14.5	40	cosl
3-10	A22	26.3	19.1	8.9	12.7b	7.8b	20.2	5.0	24.1	10.0	53	cosl
10-18	B1	18.3	16.6	9.2	15.5b	11.5b	21.6	7.3	31.0	9.9	53	cosl
18-31+	B2t	15.9	21.3	10.1	19.3b	10.7b	16.0	6.7	28.7	8.0	58	lcos

pH		ORGANIC MATTER		6C1a		6E1a		MOISTURE TENSIONS		
8m-		6A1a	6B1a							

Soil Type: Elloe gravelly sandy loam
Soil Nos.: 857Colo-8-3
Location: Trout Creek Watershed, Chaffee County, Colorado.
Physiographic Position: Mountain side. Elevation 9,955 feet.
Topography: North-facing mountain slope of about 45 percent gradient.
Drainage: Well drained.
Vegetation: Spruce, fir, and some understory grasses and shrubs.
Use: National Forest Service lands.
Collected by: John Retzer, A. J. Cline, E. M. Payne, T. Baber, W. Hunter and E. Wesswick, September 8, 1957.
Described by: A. J. Cline.

Horizon and Lincoln Lab. No.

Ao, Aoo — 1/4 to 0 inch. This horizon is a very thin mat of organic material in both decomposed and undecomposed forms. The undecomposed portions are mainly spruce and fir needles.

A1 8184 — 0 to 1 inch. Gray (10YR 5/1 dry) to very dark gray (10YR 3/1 moist) gravelly sandy loam; soft when dry, very friable when moist; moderate fine crumb structure; noncalcareous, approximate pH 6.8; about 25 percent of this horizon is gravel; lower boundary abrupt and smooth.

A21 8185 — 1 to 3 inches. Pale brown (10YR 6/3 dry) to brown or dark brown (10YR 4/3 moist) gravelly sandy loam; soft when dry, very friable when moist; weak fine platy structure, breaking to moderate fine crumbs; noncalcareous, approximate pH 6.6; there are a few small faint 10YR 5/6 mottles; about 20 percent of this horizon is gravel; lower boundary clear and wavy.

A22 8186 — 3 to 10 inches. Light brownish gray or pale brown (10YR 6/2.5 dry) to dark grayish brown or grayish brown (10YR 4.5/2 moist) gravelly loamy sand; soft when dry, very friable when moist; moderate fine granular structure; noncalcareous, approximate pH 6.6; there are a few small faint 10YR 5/6 mottles; approximately 50 percent of this horizon is gravel; lower boundary diffuse and wavy.

B1 8187 — 10 to 18 inches. Pale brown or very pale brown (10YR 6.5/3 dry) to brown (10YR 5/3 moist) stony heavy sandy loam; soft when dry, very friable when moist; moderate fine granular structure; noncalcareous; approximate pH 6.6; some of the aggregates in this horizon appear to be similar to that of the horizon below but are imbedded in a light-colored material similar to that of the horizon above; some of the soil aggregates have thin continuous clay skins and in some parts of the horizon thin seams of clay-like material are clearly visible; approximately 60 percent of the horizon is stone and gravel; lower boundary gradual and wavy.

B2t 8188 — 18 to 31 inches plus. Pale brown to light yellowish brown (10YR 6/3.5 dry) to brown or dark yellowish brown (10YR 4/3.5 moist) very stony sandy clay loam; the texture as given is that of the fine-textured material which occurs between the rocks and gravel fragments: this horizon is mainly well-weathered granite and biotite schist with about 90 percent of the horizon being rock fragments. The cracks and channels between the rocks are filled with seams of fine-textured material approximately 7.5YR 5/4 in color and approximately a sandy clay loam in texture. The faces of many of the rocks are thickly coated with clay skins as are the aggregates of the fine-textured material; the horizon is hard when dry, friable when moist; the fine-textured portions of the horizon have a weak medium subangular blocky structure; the horizon is noncalcareous, approximate pH 6.6. It is believed that this horizon represents the B2 horizon of this soil that is forming in the cracks between the rocks and may continue for some depth. It was impossible at this location to penetrate below 31 inches without an excessive amount of labor; however, at 31 inches the fine-textured, somewhat brighter material, still continued between the rock fragments. It seems probable that in view of the nature of this horizon the mechanical analysis which will be obtained will probably not represent the fine-textured seams described since much of the rock is well-weathered and on treatment is apt to shatter into sand-sized particles.

Remarks: Profile upslope in position from Elloe, Soil Nos. 857Colo-8-2.

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Fondis clay loam SOIL Nos. S63Colo-18-3 LOCATION Douglas County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18622-18629 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1 — Total Sand (2–0.05) [a]	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1b <0.0002	3A1a Noncarbonate Clay <0.002	Coarse fragments 2A2: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-5	Ap1	19.1	46.0	34.9	0.8	2.0	1.8	3.7	10.8	26.4	19.6	39.5	8.3	22.0	35	tr		
5-8	Ap2	17.5	44.1	38.4	0.8	2.0	1.6	3.3	9.8	24.5	19.6	36.3	7.7		38	tr		
8-13	B21t	13.2	40.9	45.9	1.0	1.3	1.0	2.1	7.8	21.5	19.4	30.6	5.4		46	tr		
13-19	B22t	15.9	42.6	41.5	1.0	1.8	1.5	2.9	8.7	22.1	20.5	32.5	7.2	30.0	42	tr		
19-24	B3ca	20.9	40.1	39.0	2.3	3.0	2.3	4.4	8.9	20.5	19.6	31.9	12.0		39	tr		
24-35	IIB21bca	25.6	35.5	38.9	2.2	4.3	3.6	6.5	9.0	18.8	16.7	31.5	16.6		38	2		
35-55	IIB22bca	27.8	33.4	38.8	2.4	4.6	4.1	7.5	9.2	16.7	16.7	30.1	18.6		39	tr		
55-72	IIB3bca	27.4	32.4	40.2	2.3	6.0	4.2	7.0	7.9	16.0	16.4	27.7	19.5	13.4	40	tr		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	Carbonate as $CaCO_3$ 6E1b	Carbonate as $CaCO_3$ 3A1a	6C2a Ext. Iron	Bulk density 4A1a Field State	Bulk density 4A1d 1/3-Bar	Bulk density 4A1b Air Dry	4D1 COLE	Water content 4B4 Field State	Water content 4B1c 1/3-Bar	Water content 4B2 15-Bar	4C1 1/3-to 15-Bar	Field Capacity	pH	pH 8C1b Sat. Paste	pH 8C1a (1:1)

Soil Type	:	*Fondis clay loam
Soil Nos.	:	S63Colo-18-3
Location	:	285 feet west, 360 feet south of northeast corner of Section 5, T9S, R65W, Douglas County, Colorado
Climate	:	Continental, average annual precipitation 17 inches, mean annual temperature 46 degrees F. Growing season 130 days. Elevation 6,750 feet
Vegetation	:	Wheat
Parent Material	:	Outwash and Aeolian, probably Quartenary age
Physiographic Position	:	Upland
Relief	:	Nearly level, 2 percent east facing slope. Slope about 800 feet long, Pit located approximately 300 feet from crest of ridge
Drainage	:	Internal drainage is slow to very slow, intake is moderate
Moisture	:	Moist in the top 8 inches and below 4 feet. Dry in between
Stoniness	:	Few fine water worn gravels throughout
Salt or Alkali	:	None other than calcium carbonate observed
Erosion	:	Slight, primarily water
Sampled by	:	R. K. Dansdill, J. B. Brown, R. H. Jordan, and L. G. Shields; August 13, 1963.
Described by	:	J. B. Brown

Horizon and Lincoln Lab. No.	
Ap1 18622	0 to 5 inches. Very dark grayish brown (10YR 3/2 moist) silty clay loam; grayish brown (10YR 4.5/2 dry); weak to moderate fine granular structure; soft when dry, firm when moist; abrupt smooth boundary.
Ap2 18623	5 to 8 inches. Very dark grayish brown (10YR 3/2 moist) clay loam; dark grayish brown (10YR 4.5/2 dry); moderate medium to coarse platy structure; very hard when dry, firm when moist; some bleached sand grains; few water worn gravels; abrupt smooth boundary.
B21t 18624	8 to 13 inches. Very dark grayish brown (10YR 3/2 moist) clay; dark grayish brown (10YR 4/2 dry) and very dark grayish brown (10YR 3.5/2 moist and crushed); moderate medium prisms breaking to strong medium and fine angular blocks; very hard when dry, very firm when moist; thin continuous clay films on ped surfaces; clear smooth boundary.
B22t	13 to 19 inches. Brown (10YR 4/3 moist) clay; brown (10YR 4.5/3 dry); weak medium to coarse prisms

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Fondis clay loam SOIL Nos. 863Colo-18-4 LOCATION Douglas County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18630-18637 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth	Horizon	Size class and particle diameter (mm) 3A1												3A1a	Coarse fragments 2A2		
		Total			Sand					Silt				Noncar-			
		Sand	Silt	Clay	Very coarse	Coarse	Medium	Fine	Very fine		Int. III	Int. II					

Soil Type	:	*Fondis clay loam
Soil Nos.	:	S63Colo-18-4
Location	:	122 feet west of the southeast corner of Section 19, T8S, R66W, Douglas County, Colorado
Climate	:	Continental, average annual precipitation 17 inches, mean annual temperature 46 degrees F. Growing season 140 days. Elevation 6,700 feet
Vegetation	:	Wheat
Parent Material	:	Outwash and aeolian, probably Quartenary age
Physiographic Position	:	Upland
Relief	:	Nearly level, 2 percent northeast facing slope. Slope about 800 feet in length. Pit about 400 feet below ridge
Drainage	:	Internal drainage medium to slow; moderate intake rate
Moisture	:	Moist to 6 feet plus. This field summer fallowed, summer 1963
Stoniness	:	Few fine water worn gravels throughout the pedon
Salt or Alkali	:	None observed, other than calcium carbonate
Erosion	:	Slight, primarily water
Sampled by	:	R. K. Dansdill, J. B. Brown, R. H. Jordan, and L. G. Shields; August 13, 1963
Described by	:	J. B. Brown

Horizon and Lincoln Lab. No.	
Ap1 18630	0 to 5 inches. Very dark grayish brown (10YR 3/2 moist) light silty clay loam; dark grayish brown (10YR 4.5/2 dry); moderate fine granular structure; soft when dry, friable when moist; abrupt smooth boundary.
Ap2 18631	5 to 7 inches. Very dark grayish brown (10YR 3/2 moist) clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; hard when dry, firm when moist; cultivation marks are present; abrupt smooth boundary.
B21t 18632	7 to 12 inches. Dark brown (10YR 3/3 moist) clay; brown (10YR 4/3 dry); moderate medium prismatic structure breaking to strong fine angular blocks; very hard when dry, very firm when moist; thin continuous clay films on ped surfaces; few slickensides; clear smooth boundary.
B22t 18633	12 to 24 inches. Dark grayish brown (10YR 4/2 moist) clay; grayish brown (10YR 4.5/2 dry); moderate medium to fine prisms breaking to strong fine angular blocks; very hard when dry, very firm when moist; thin nearly continuous clay films; many slickensides; abrupt smooth boundary.
B3ca 18634	24 to 28 inches. Yellowish brown (10YR 5/4 moist) heavy sandy clay loam; light yellowish brown (10YR 6/4 dry) and brown (10YR 5/3 moist and rubbed); moderate medium prisms breaking to moderate medium angular blocks; very hard when dry, very firm when moist; very highly calcareous; some dark streaks 1/4 to 1/2 inches wide are present in this horizon along with lime mycelia; thin patchy clay films; clear smooth boundary.
IIB2bca 18635	28 to 45 inches. Dark brown (7.5YR 4/4 moist) sandy clay loam; brown (7.5YR 5.5/4 dry); moderate medium to coarse subangular blocky structure; hard when dry, firm when moist; very highly calcareous; few thin patchy clay films; some lime mycelia; fine gravel estimated at 5 percent; gradual boundary.
IIB3bca 18636	45 to 57 inches. Strong brown (7.5YR 5/6 moist) sandy clay loam; reddish yellow (7.5YR 6/6 dry); weak coarse prismatic structure; hard when dry, firm when moist; very highly calcareous; few patchy clay films on vertical faces; lime streaks 2 to 6 inches wide; gradual boundary.
IICca 18637	57 to 70 inches. Light brown (7.5YR 6/4 moist) light sandy clay loam; pink (7.5YR 7/4 dry); weak coarse prismatic structure; hard when dry, friable when moist; very highly calcareous; lime appears to increase with depth.

Remarks: This soil is common to the tablelands in Douglas County and on side slopes overlying the Dawson formation. The buried soils are typical but the break between the older soils and the modern soil is somewhat obscure. This is close to the southern extremity of the colder part of the area where this soil has been mapped in Douglas County. Slickensides are not evident in this soil in the buried horizons. Although 1963 was a much drier year than normal, this soil is moist throughout where it had been summer fallowed during 1963. Under native sod this soil generally has a loam surface 3 to 4 inches thick with a clay loam B1 horizon. Where cultivated the surface is mixed and is generally a light clay loam in texture.

Bureau of Public Roads Samples: B22t, IIB2bca, and IICca horizons.

Mineralogy (Method 7B1): Ap1, B22t, and IIB3bca horizons. Observations on very fine sand: Feldspar and quartz are present in approximately equal amounts; accessory minerals are 10 to 20 percent. Orthoclase is the principal feldspar; microcline and low-calcium plagioclase are present in lesser amounts. Biotite and hornblende are the most abundant accessory minerals. Other minerals identified include epidote, zoisite, hypersthene, zircon, chert, garnet and opaques; volcanic glass is absent. The number of ferromagnesian minerals appears to increase slightly in the IIB3bca horizon; otherwise, the mineralogy is similar.

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Hartun loamy sand SOIL Nos. S63Colo-58-3 LOCATION Sedgwick County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18524-18534 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2 (< 19)	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-6	Ap	86.5	7.4	6.1	2.6	15.7	24.1	34.3	9.8	5.1	2.3	31.2	76.7			2		
6-14	B2	74.0	14.1	11.9	1.6	12.0	18.6	29.6	12.2	9.4	4.7	36.3	61.8			tr		
14-18	B21tb	68.9	15.9	15.2	2.1	12.1	15.8	26.4	12.5	10.4	5.5	36.2	56.4			tr		
18-26	B22tb	72.7	14.0	13.3	2.9	13.8	15.9	26.6	13.5	9.4	4.6	36.8	59.2			tr		
26-33	B3b	70.2	15.8	14.0	2.0	12.6	14.8	25.8	15.0	10.2	5.6	38.8	55.2			tr		
33-42	C1b	55.6	27.1	17.3	1.7	9.6	10.0	16.5	17.8	17.4	9.7	44.2	37.8			tr		
42-59	C2b	84.5	8.3	7.2	3.7	16.5	18.9	28.9	16.5	5.7	2.6	36.6	68.0			4		
59-65	IIC3b	68.0	7.0	25.0	2.0	9.3	13.4	25.0	18.3	4.4	2.6	35.6	49.7			tr		
65-80	IIC4cab	66.8	9.1	24.1	1.8	8.0	12.1	25.5	19.4	4.8	4.3	37.6	47.4			tr		
80-134	IIC5cab	75.7	6.8	17.5	2.9	12.4	14.6	25.5	20.3	4.4	2.4	38.0	55.4			tr		
134-216	IIC6b	79.2	12.0	8.8	3.6	12.5	14.6	24.0	24.5	6.9	5.1	43.4	54.7			7		

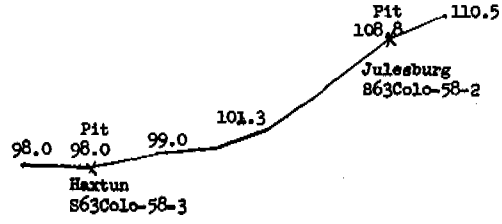
Depth (In.)	6Ala Organic carbon [a]	6Bla Nitrogen	C/N		6Elb 6B2a Carbonate as $CaCO_3$		Bulk density: 4Ala Field State	4Ald 1/3-Bar	4Alb Air Dry	4D1 COLE	Water content: 4B4 Field State	4Blc 1/3-Bar	4B2 15-Bar	4C1 1/3 to 15-Bar		pH: 8C1b Sat. Paste	8C1a (1:1)
	Pct.	Pct.			Pct.		g/cc	g/cc	g/cc		Pct.	Pct.	Pct.	in./in.			
0-6	0.28	0.033	8		-(s)		1.72	1.70c	1.72	0.003	12.3	10.4e	2.9	0.13r			6.8
6-14	0.32	0.044	7		-(s)		1.63	1.59	1.66	0.014	14.3	11.4	5.2	0.10			6.9
14-18	0.28	0.039	7		-(s)		1.66	1.60	1.71	0.020	14.4	12.8	7.4	0.09			7.0
[redacted]																	

Soil Type: Haxtun loamy sand
Soil Nos.: 863Colo-58-3
Location: 726 feet north, 80 feet west of southeast corner, Sec. 18, T9N, R46W, Sedgwick County, Colorado
Climate: Continental climate, average annual precipitation of 17.5 inches, frost-free season of 147 days, mean annual temperature of 49.6 degrees F.
Elevation: 3,900 feet
Vegetation: Cultivated
Parent Material: Aeolian sand over loess-like material
Physiographic Position: Upland
Relief: Slightly concave, 1 percent slope
Drainage: Well drained
Moisture: Moist to 26 inches, nearly dry below
Salt or Alkali: None
Erosion: Slight, primarily wind
Sampled by: R. C. Accola, J. I. Brubacher, R. B. Grossman, R. Moreland, E. M. Payne, and J. L. Walker: July 8, 1963
Described by: J. I. Brubacher

Horizon and Lincoln Lab. No.	
Ap 18524	0 to 6 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loamy sand; weak fine granules breaking to single grain structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.
B2 18525	6 to 14 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) sandy loam; weak medium prismatic breaking to weak medium subangular blocky structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.
B21tb 18526	14 to 18 inches. Grayish brown (10YR 5/2 dry) to very dark brown (10YR 2/2 moist) sandy clay loam; weak moderate medium prismatic breaking to weak moderate medium subangular blocky structure; soft dry, very friable when moist; noncalcareous; very thin patchy clay skins; clear smooth boundary.
B22tb 18527	18 to 26 inches. Gray (10YR 5/1 dry) to very dark gray (10YR 3/1 moist) sandy clay loam; weak moderate medium prismatic breaking to weak moderate subangular blocky structure; very friable moist; noncalcareous; thin continuous clay skins; streaks of 10YR 2/1 when moist; clear smooth boundary.
B3b 18528	26 to 33 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) sandy loam; weak medium prismatic breaking to weak, medium subangular blocky structure; slightly hard dry, very friable when moist; noncalcareous; very thin patchy clay skins; clear smooth boundary.
C1b 18529	33 to 42 inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) loam; weak medium prismatic breaking to weak medium subangular blocky structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.
C2b 18530	42 to 59 inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) loamy sand; massive; soft dry, very friable when moist; noncalcareous; abrupt wavy boundary.
IIC3b 18531	59 to 65 inches. Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) heavy sandy loam; massive; slightly hard dry, very friable when moist; noncalcareous.
IIC4cab 18532	65 to 80 inches. Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) heavy sandy loam; massive; soft dry and very friable when moist; highly calcareous; clear and wavy boundary.
IIC5cab 18533	80 to 134 inches. Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) heavy sandy loam; weak coarse platy structure; soft dry and very friable when moist; highly calcareous; clear wavy boundary.
IIC6b 18534	134 to 216 inches. Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) heavy sandy loam; massive; soft dry and very friable when moist; noncalcareous.

Note: 15 feet, soil temperature was 10.5° C
18 feet, soil temperature was 10.6° C

Landscape Profile:



Horizontal scale — 200 feet
Vertical scale — 10 feet

Bureau of Public Roads Samples:

Ap - 0-6 inches
B21tb - 18-26 inches
C2b - 42-59 inches
IIC4cab - 65-80 inches

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Haxtun loamy sand SOIL Nos. S63Colo-58-5 LOCATION Sedgwick County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18535-18545 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Silt: Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	(2–0.1)	3A1b <0.002	3A1a Non-carbonate Clay <0.002	Coarse fragments 2A2: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	< 19 Pct. of < 76mm	
0-6	Ap	78.7	13.6	7.7	1.5	14.5	24.9	27.8	10.0	9.0	4.6	30.8	68.7	4.5	8	tr		
6-14	B21	78.2	12.0	9.8	1.5	14.4	25.0	28.5	8.8	7.6	4.4	28.8	69.4		10	tr		
14-19	B22	68.5	17.6	13.9	0.5	8.9	19.9	28.2	11.0	10.6	7.0	35.1	57.5	9.0	14	tr		
19-25	B21tb	66.6	17.3	16.1	0.7	7.4	17.6	28.7	12.2	10.7	6.6	37.1	54.4		16	tr		
25-33	B22tb	56.7	21.5	21.8	0.2	4.2	10.8	24.5	17.0	13.4	8.1	44.4	39.7	15.7	22	tr		
33-41	B3b	58.6	23.1	18.3	0.2	2.4	6.8	24.0	25.2	15.5	7.6	56.3	33.4		18	tr		
41-59	C1b	78.3	12.9	8.8	1.6	7.6	17.2	33.4	18.5	9.1	3.8	45.7	59.8	4.9	9	tr		
59-80	IIC2cab	73.9a	16.9	9.2	4.0	14.1	16.8	24.6	14.4	8.2	8.7	34.7	59.5	1.2	9	2		
80-112	IIC3cab	83.6a	9.7	6.7	9.4	18.9	17.6	25.5	12.2	5.4	4.3	30.0	71.4		7	10		
112-134	IIC4cab	45.2a	10.5	44.3	5.1	9.3	8.7	12.2	9.9	5.2	5.3	21.2	35.3		44	10		
134-144	IIC5cab	29.7b	46.9	23.4	3.9	5.9	5.3	7.8	6.8	4.6	42.3	15.2	22.9		11	6		

Depth (In.)	6A1a Organic carbon C	6B1a Nitrogen	C/N	Carbonate as $CaCO_3$ 6E1b 6E2a <2 mm.	Carbonate as $CaCO_3$ 3A1a <0.002 mm.	6C2a Ext. Iron as Fe	Bulk density 4A1a Field State	Bulk density 4A1d 1/3-Bar	Bulk density 4A1b Air Dry	4D1 COLE	Water content 4B4 Field State	Water content 4B1c 1/3-Bar	Water content 4B2 15-Bar	4C1 1/3- to 15-Bar	Field Capacity g	pH		8C1a (1:1)
	Pct.	Pct.		Pct.	Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct.	Pct.	in./in.	Pct.			
0-6	0.45	0.055	8			0.2	1.75	1.71d	1.75	0.007	9.7	10.8e	3.6	0.12f	14.0			6.4
6-14	0.37	0.047	8			0.3	1.60	1.54d	1.61	0.014	11.4	13.0e	4.5	0.13f	11.7			6.9
14-19	0.36	0.046	8			0.3	1.59	1.52	1.62	0.020	13.7	13.1	6.6	0.10	13.0			7.0
19-25	0.36	0.045	8			0.3	1.71	1.63	1.75	0.024	12.3	14.5	7.5	0.11	13.7			7.0
25-33	0.41	0.049	8	-(s)		0.3	1.67	1.58	1.72	0.028	12.2	17.1	9.4	0.12	15.3			7.1
33-41	0.24	0.036		-(s)		0.3	1.64	1.56	1.66	0.020	10.5	15.4	9.0	0.10	16.3			7.3
41-59	0.04			tr(s)	-	0.2	1.66	1.62d	1.64	0.003	4.8	12.9e	4.1	0.14f	10.2			8.1
59-80	0.02			10	tr	0.2	1.58	1.53d	1.55	0.003	9.0	16.0e	4.5	0.18f				8.4
80-112	0.02			2	tr	0.2							3.0					8.4
112-134	0.01			2	-	0.4							18.7					8.0
134-144	0.04			56	12	0.2							7.4					8.3

Depth (In.)	Extractable bases 5B1a 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap. 5A3a Sum Cations	5A1a NH_4OAc	8D3 Ca/Mg	Base saturation 5C3 Sum Cations	5C1 NH_4OAc
	meq/100 g									Pct.	Pct.
0-6	4.2	0.9	tr	0.7	5.8	2.4	8.2	6.3		71	92
6-14	6.1	1.3	tr	0.5	7.9	2.0	9.9	8.0		80	99
14-19	8.0	1.7	tr	0.6	10.3	2.4	12.7	10.2	4.7	81	101
19-25	10.3	2.2	tr	0.7	13.2	2.2	15.4	13.0	4.7	86	102
25-33	12.7	2.7	tr	1.0	16.4	2.4	18.8	15.8	4.7	87	104
33-41	12.0	2.7	0.1	1.0	15.8	1.8	17.6	14.8	4.4	90	107
41-59	6.9 h	1.4i	tr	0.6	8.9			8.4	4.9		
59-80	6.6 h	1.3i	0.1	0.7	8.7			7.6	5.1		
80-112	4.9 h	1.2i	0.1	0.6	6.8			5.8	4.1		
112-134	21.2 h	7.2i	0.7	3.7	32.8			30.8	2.9		
134-144	6.0 h	1.7i	0.2	1.0	8.0			7.5	3.5		

Depth (In.)	Ratios to Clay 8D2 NH_4OAc CEC	8D2 Ext. Iron	8D1 15-Bar Water
[illegible]	[illegible]	[illegible]	[illegible]

a. Carbonate grains: < 5 percent. b. Carbonate grains: 5-25 percent.
c. 6.3 kg/m² to 60 inches (Method 6A). d. 1/10-Bar (Method 4A1g).
e. 1/10-Bar (Method 4B1c). f. 1/10- to 15-Bar in./in. (Method 4C2).
g. Field capacity estimates: A spade-width ditch about 6 inches deep was dug around a 3x3 foot square and the soil banked up to the outside to form a dam. About 200 gallons of water were applied the morning of [illegible]

Soil Type: Haxtun loamy sand
Soil Nos.: S63Colo-58-5

Elevation: 3,900 feet
Vegetation: Cultivated
Parent Material: Aeolian sand over loess-like material
Physiographic Position: Upland
Relief: Slightly concave, 1 percent slope
Drainage: Well drained
Moisture: Moist to 26 inches nearly dry below
Salt or Alkali: None
Erosion: Slight, primarily wind
Sampled by: R. C. Accola, J. I. Brubacher, R. B. Grossman, R. Moreland, E. M. Payne, and J. L. Walker: July 9, 1963
Described by: J. I. Brubacher

Horizon and
Lincoln
Lab. No.

Ap 0 to 6 inches. Grayish brown (10YR 5/2 dry) to very dark brown (10YR 2/2 moist) loamy sand; weak fine

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Haxtun loamy sand SOIL Nos. S63Colo-58-6 LOCATION Sedgwick County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18546-18552 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (in.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-7	Ap	74.7	16.2	9.1	0.9	11.6	22.4	28.7	11.1	10.3	5.9	33.8	63.6			tr		
7-18	B21	74.1	15.6	10.3	1.6	10.7	22.2	29.3	10.3	9.6	6.0	32.7	63.8			tr		
18-24	B22	65.6	19.3	15.1	0.8	8.6	17.6	26.6	12.0	12.0	7.3	36.6	53.6			tr		
24-29	B21tb	59.6	21.7	18.7	0.8	6.4	13.6	24.9	13.9	12.7	9.0	39.5	45.7			tr		
29-39	B22tb	48.7	28.7	22.6	0.7	4.4	8.0	18.8	16.8	16.6	12.1	44.3	31.9			tr		
39-47	B3b	49.9	29.3	20.8	0.6	3.0	5.6	18.6	22.1	17.5	11.8	51.5	27.8			tr		
47-54	C1b	67.6	19.0	13.4	0.8	4.4	8.7	27.8	25.9	13.1	5.9	56.2	41.7			3		

Depth (in.)	6A1a Organic carbon	6B1a Nitrogen	C/N		Carbonate as $CaCO_3$		Bulk density				Water content		8D1			pH		
													4B2 15-Bar	15-Bar Water to Clay Ratio				8C1a (1:1)
	Pct.	Pct.			Pct.		g/cc	g/cc	g/cc		Pct.	Pct.	Pct.					
0-7	0.56	0.063	9										3.5	0.38				6.1
7-18	0.41	0.054	8										4.2	0.41				6.4
18-24	0.36	0.050	7										6.3	0.42				6.7
24-29	0.41	0.048	9										7.7	0.41				6.8
29-39	0.49	0.055	9										9.5	0.42				6.9
39-47	0.28												8.6	0.41				7.0
47-54	0.08												5.2	0.39				7.1

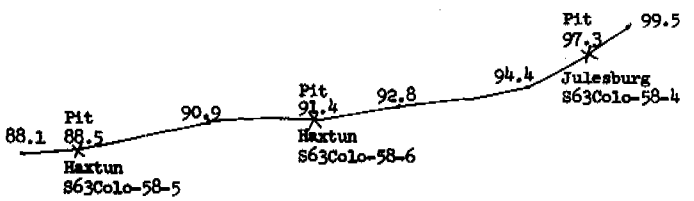
Depth (in.)	Extractable bases: Ca	Mg	Na	K												Base saturation	
	meq/100 g															Pct.	Pct.

Depth (in.)

Soil Type: Haxtun loamy sand
Soil Nos.: S63Colo-58-6
Location: 430 feet east, 310 feet south of northwest corner, Sec. 35, T10N, R47W, Sedgwick County, Colorado.
Climate: Continental climate, average annual precipitation of 17.5 inches, frost-free season of 147 days, mean annual temperature of 49.6 degrees F.
Elevation: 3,900 feet
Vegetation: Cultivated
Parent Material: Aeolian sand over loess-like material.
Physiographic Position: Upland
Relief: 1 percent slope
Drainage: Well drained
Moisture: Moist to 18 inches, nearly dry below
Salt or Alkali: None
Erosion: Slight, primarily wind
Sampled by: R. C. Accola, J. I. Brubacher, R. B. Grossman, R. Moreland, E. M. Payne, and J. L. Walker: July 9, 1963
Described by: J. I. Brubacher

Horizon and Lincoln Lab. No.	
Ap 18546	0 to 7 inches. Grayish brown (10YR 5/2 dry) to very dark brown (10YR 2/2 moist) loamy sand; weak fine granular structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.
B21 18547	7 to 18 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) sandy loam; weak medium prismatic breaking to weak medium subangular blocky structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.
B22 18548	18 to 24 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) sandy loam; weak medium prismatic breaking to weak medium subangular blocky structure; slightly hard dry, very friable when moist; noncalcareous; clear smooth boundary.
B21tb 18549	24 to 29 inches. Dark grayish brown (10YR 4/2 dry) to very dark brown (10YR 2/2 moist) fine sandy clay loam; weak moderate medium prismatic breaking to weak moderate medium subangular blocky structure; slightly hard dry, very friable when moist; noncalcareous; thin continuous clay skins; clear smooth boundary
B22tb 18550	29 to 39 inches. Dark grayish brown (10YR 4/2 dry) to very dark brown (10YR 2/2 moist) and black (10YR 2/1 crushed) fine sandy clay loam; weak moderate medium prismatic breaking to weak medium subangular blocky structure; slightly hard dry, very friable when moist; noncalcareous; thin continuous clay skins; clear smooth boundary.
B3b 18551	39 to 47 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) and dark grayish brown (10YR 4/2 crushed) loam; weak medium prismatic breaking to weak medium subangular blocky structure; slightly hard dry, very friable when moist; noncalcareous; 40 percent of horizon has streaks of brown (10YR 5/3 moist) color; clear smooth boundary.
C1b 18552	47 to 54 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) sandy loam; weak medium prismatic breaking to weak medium subangular blocky structure; soft dry, very friable when moist; noncalcareous; clear wavy boundary.
IIC2cab	54 to 66 inches. Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) gravelly sandy clay loam; massive structure; soft dry, very friable when moist; highly calcareous.

Landscape Profile:



Horizontal Scale 200 feet
Vertical Scale 10 feet

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Heath clay loam **LOCATION** Chaffee County, Colorado

SOIL NOS. S58Colo-8-2 **LAB. NOS.** 9050-9055

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-2	A1	8.6a	6.1a	3.3a	6.2a	8.0a	40.8	27.0	28.7	23.5	19	cl/l
2-5	AB	4.6a	4.6a	2.8a	6.0a	7.3a	35.8	38.9	25.3	21.1	3	cl
5-9	B2t	2.6b	3.9b	2.9b	5.4b	6.4b	34.5	44.3	22.0	22.2	7	c
9-13	B3ca	6.5b	5.0b	3.0b	4.2b	4.9b	35.2	41.2	16.8	25.9	24	c
13-28	Cca	10.4c	6.5c	3.3c	4.5c	5.2c	36.7	33.4	16.4	28.2	35	cl
28-39	C	9.7c	7.4c	3.4c	4.3c	4.0c	40.7	30.5	13.9	33.2	50	cl

	pH		ORGANIC MATTER			Free Iron		6E1a		MOISTURE TENSIONS		
8C1a			6A1a ORGANIC CARBON	6B1a NITROGEN	C/N	$\%Fe_2O_3$		$CoCO_3$ equivalent		1/10 ATMOS.	1/3 ATMOS.	4B2 15 ATMOS.
1:1	1:5	1:10	%	%		6C1a		%		%	%	%
7.4			3.24	0.294	11	2.9		<1				12.9
7.5			3.09	0.266	12	3.2		<1				14.5
7.7			3.09	0.287	11	3.3		2				16.4
7.9			2.47	0.237	10	2.7		14				17.4
8.1			0.99	0.123	8	2.5		28				12.9
8.2			0.74			2.6		20				11.4

5A1a	EXTRACTABLE CATIONS	5B1a	BASE	5C3	Sum	Sum	Ca/Mg

Soil Type: Heath clay loam. Described by: A. J. Cline
Location: SE¼ of Sec. 17, T13S, R77W, Chaffee County, Colorado.
Date of Sampling: September 1957.
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline
Physiographic Position: Side slope of a high mountain valley at an elevation of approximately 9,000 feet.
Topography: A moderate convex slope of approximately 4 percent facing east.
Drainage: Well drained. Vegetation: Snakeweed, ring muhly, with some blue grama.
Use: National Forest Service land.
Soil Nos.: S58Colo-8-2

Lincoln Lab. No.	Horizon		
9050	A_1	0-2 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/1.5 moist) loam; soft when dry, very friable when moist; moderate very fine granular structure; noncalcareous; lower boundary clear and smooth.
9051	AB	2-5 inches	Very dark grayish brown or dark grayish brown (10YR 3.5/2 dry) to very dark brown (10YR 2/2 moist) heavy loam or light clay loam; slightly hard when dry, very friable when moist; weak to moderate fine subangular blocky structure breaking to moderate fine granules; noncalcareous; there are a few thin patchy clay skins principally on the vertical faces of the soil aggregates; lower boundary clear and smooth.
9052	B_{2t}	5-9 inches	Very dark grayish brown or dark grayish brown (10YR 3.5/2 dry) to very dark brown or very dark grayish brown (10YR 2.5/2 moist) clay loam; hard when dry, very friable when moist; weak to moderate fine prismatic structure breaking to moderate fine subangular blocks; noncalcareous; there are thin to medium patchy clay skins on both the horizontal and vertical faces of most of the soil aggregates; lower boundary gradual and smooth.
9053	B_{3ca}	9-13 inches	Grayish brown (2.5Y 5/2 dry) to dark grayish brown (2.5Y 4/2 moist) heavy loam or light clay loam; hard when dry, very friable when moist; weak to moderate fine prismatic structure breaking to moderate fine subangular blocks; violently effervescent; this is a weak horizon of lime accumulation with some visible lime occuring as concretions; there are thin patchy clay skins principally on the vertical faces of some of the soil aggregates; lower boundary gradual and smooth.
9054	Cca	13-28 inches	Light brownish gray (2.5Y 6/2 dry) to dark grayish brown or grayish brown (2.5Y 4.5/2 moist) gravelly loam; hard when dry, very friable when moist; massive or very weak fine subangular blocky structure; violently effervescent; this is a moderate horizon of lime accumulation with visible lime occurring as concretions, as thin seams and streaks or as coatings on the surfaces of the rock and gravel; approximately 25 percent of this horizon is cobble and gravel; lower boundary diffuse and smooth.
9055	C	28-39 + inches	Light olive brown (2.5Y 5/3 dry) to olive brown (2.5Y 4/3 moist) gravelly clay loam; hard when dry, very friable when moist; massive; violently calcareous; this horizon contains

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Heath loam **LOCATION** Chaffee County, Colorado

SOIL NOS. S58Colo-8-4 **LAB. NOS.** 9062-9066

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	3A1 2A2 > 2 (<19mm)	TEXTURAL CLASS
0-3	A1	4.1a	3.5a	2.6b	6.0b	6.1b	42.9	34.8	21.6	30.6	11	cl
3-7	AB	2.1a	2.3a	1.4b	3.6b	4.2b	45.0	41.4	15.7	35.6	14	sic
7-18	B2t	1.9a	2.1a	1.2b	3.2b	4.2b	48.4	39.0	15.6	38.9	6	sicl
18-26	B3ca	2.2b	2.4b	1.6b	3.2b	4.0b	48.7	37.9	15.9	38.8	8	sicl
26-58	Cca	1.4c	1.9c	1.4c	4.6c	7.5c	56.2	27.0	24.6	42.2	Tr.	sicl

DEPTH INCHES	pH 8C1a 1:1	1:5	1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron $\%Fe_2O_3$ 6C1a		6E1a $CaCO_3$ equivalent %		MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
0-3	8.0			1.65	0.171	10	2.6		18				13.7
3-7	8.0			1.45	0.154	9	2.5		20				14.1
7-18	8.1			1.10	0.120	9	2.5		21				13.4
18-26	8.2			1.10	0.118	9	2.5		22				13.6
26-58	8.0			1.12	0.108	10	3.0		19				13.4

DEPTH INCHES	5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. % NH_4Ac EXCH.	Base Sat. % on Sum Cations	Sum Bases	Sum Cations	Ca/Mg		
	← milliequivalents per 100g. soil →												
0-3	18.0		2.1	<0.1	<0.1	1.3							
3-7	18.8		2.3	<0.1	<0.1	0.7							
7-18	18.3		2.9	<0.1	0.1	0.4							
18-26	18.3		4.3	<0.1	0.1	0.4							
26-58	19.1		5.0	<0.1	0.2	0.4							

a. Common $CaCO_3$ concr.
b. Common $CaCO_3$ concr. Also, common smooth black concr. (Mn?)
c. Common $CaCO_3$ concr. Also, few smooth black concr. (Mn?)

Soil Type: Heath loam. **Described by:** A. J. Cline
Location: NE¼ of Sec. 28. T13S. R77W. Chaffee County. Colorado.

Date of Sampling: September 1957
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline
Physiographic Position: Side slope of a high mountain valley at an elevation of approximately 9,000.
Topography: A moderate convex slope of approximately 4 percent facing east.
Drainage: Well drained.
Vegetation: Sage, western wheat grass, and ring muhly.
Use: National Forest Service land.
Soil Nos.: 858Colo-8-4

Lincoln Horizon
Lab. No.
9062 A 0-2 Dark grayish brown or grayish brown (2.5Y 4.5/2 dry) to

slightly hard when dry, very friable when moist; moderate very fine granular structure; strongly effervescent; lower boundary clear and smooth.

9063 AB 3-7 inches Dark gray (2.5Y 4/1 dry) to black or very dark grayish brown (2.5Y 2.5/2 moist) clay loam; slightly hard when

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Julesburg loamy sand SOIL Nos. 863Colo-58-2 LOCATION Sedgwick County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18497-18504 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth	Horizon	Size class and particle diameter (mm) 3A1														
		Total			Sand					Silt					Coarse fragments 2A2		
		Sand	Silt	Clay	Very coarse	Coarse	Medium	Fine	Very fine		Int. III	Int. II			> 2	2 - 19	19 - 76

Soil Type: *Julesburg loamy sand
Soil Nos.: 863Colo-58-2
Location: 1,043 feet north, 165 feet east of west quarter corner, Sec. 17, T9N, R46W, Sedgwick County, Colorado.
Climate: Continental climate, average annual precipitation of 17.5 inches, frost-free season of 147 days, mean annual temperature of 49.6 degrees F.
Elevation: 3,900 feet
Vegetation: Cultivated
Parent Material: Aeolian sands
Physiographic Position: Upland
Relief: Convex 4 percent southwest facing slopes
Drainage: Well drained
Moisture: Nearly dry
Salt or Alkali: None
Erosion: Slight, primarily wind
Sampled by: R. C. Accola, J. I. Brubacher, R. B. Grossman, R. Moreland, E. M. Payne, and J. L. Walker: July 8, 1963

Described by: J. I. Brubacher

Horizon and
Lincoln
Lab. No.

Ap 0 to 7 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loamy sand;

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Julesburg loamy sand SOIL Nos. S63Colo-58-4 LOCATION Sedgwick County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18505-18511 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2 Pct.	2 – 19 Pct. of < 76mm	19–76 Pct. of < 76mm
		Pct. of < 2 mm																
0-6	Ap1	87.8	6.6	5.6	9.4	22.8	23.0	26.3	6.3	5.2	1.4	22.8	81.5			1		
6-10	Ap2	84.0	5.7	10.3	6.8	18.4	20.8	31.1	6.9	3.6	2.1	25.1	77.1			1		
10-18	B2t	85.8	4.8	9.4	9.0	20.0	19.5	30.5	6.8	2.9	1.9	24.3	79.0			tr		
18-32	B3	86.3	5.5	8.2	5.5	17.6	21.7	33.5	8.0	3.5	2.0	27.7	78.3			tr		
32-46	C1	90.8	3.8	5.4	3.7	16.4	24.9	38.2	7.6	2.4	1.4	27.7	83.2			tr		
46-61	C2	90.6	4.3	5.1	4.4	16.4	21.7	37.0	11.1	2.8	1.5	32.9	79.5			tr		
61-76	C3	93.6	1.8	4.6	3.2	23.5	26.2	32.6	8.1	1.2	0.6	24.7	85.5			tr		

Depth (In.)	6A1a Organic carbon a	6B1a Nitrogen	C/N		6E2a Carbonate as $CaCO_3$	6C2a Ext. Iron as Fe	Bulk density: 4A1a Field State	4A1g 1/10-Bar	4A1b Air Dry	4D1 COLE	Water content: 4B4 Field State	4B1c 1/10-Bar	4B2 15-Bar	4C2 1/10- to 15-Bar		pH: 8C1a (1:1)		
	Pct.	Pct.			Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct.	Pct.	in/in.				
0-6	0.28	0.030	9			0.2	1.63	1.58	1.60	0.003	5.2	8.5	2.5	0.09				6.5
6-10	0.34	0.038	9			0.3	1.80	1.76	1.80	0.007	8.5	10.9	3.7	0.13				6.5
10-18	0.21	0.028				0.3	1.73	1.69	1.74	0.010	7.1	9.3	3.7	0.08				6.6
18-32	0.13	0.017				0.2	1.82	1.73	1.80	0.014	4.9	12.7	3.2	0.16				6.9
32-46	0.04				-(a)	0.2	1.80	1.75	1.76	0.003	3.3	12.6	2.2	0.18				7.2
46-61	0.02				-(a)	0.2	1.78b	1.74b	1.74b		4.7b	9.3	2.1	0.12				7.2
61-76	0.02				-(a)	0.2							1.9					7.1

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap.: 5A3a Sum Cations	5A1a NH_4OAc	8D3 Ca/Mg	Base saturation: 5C3 Sum Cations	5C1 NH_4OAc
	meq/100 g									Pct.	Pct.
0-6	3.0	0.9	tr	0.3	4.2	1.9	6.1	4.6		69	91
6-10	5.5	1.3	tr	0.3	7.1	2.9	10.0	7.7	4.2	71	92
10-18	5.8	1.4	tr	0.3	7.5	1.9	9.4	7.8	4.1	80	96
18-32	4.7	1.5	tr	0.3	6.5	1.8	8.3	6.3	3.1	78	103
32-46	3.2	0.9	-	0.2	4.3	0.8	5.1	4.2		84	102
46-61	3.0	0.9	-	0.2	4.1	0.8	4.9	4.0		84	103
61-76	2.6	0.8	-	0.2	3.6	1.1	4.7	3.5		77	103

Depth (In.)	Ratios to Clay 8D1: NH_4OAc CEC	Ext. Iron	15-Bar Water
0-6	0.82	0.04	0.45
6-10	0.75	0.03	0.36
10-18	0.83	0.03	0.39
18-32	0.77	0.02	0.39
32-46	0.78	0.04	0.41
46-61	0.78	0.04	0.41
61-76	0.76	0.04	0.41

a. 3.2 kg/m^2 to 60 inches (Method 6A).
b. One clod.

Soil Type: *Julesburg loamy sand
Soil Nos.: S63Colo-58-4
Location: 858 feet east, 50 feet south of northwest corner, Sec. 35, T10N, R47W, Sedgwick County, Colorado.
Climate: Continental climate, average annual precipitation of 17.5 inches, frost-free season of 147 days, mean annual temperature of 49.6 degrees F.
Elevation: 3,900 feet
Vegetation: Cultivated
Parent Material: Aeolian sands
Physiographic Position: Upland
Relief: Convex, 3 percent southwest facing slope
Drainage: Well drained
Moisture: Moist to 10 inches, dry below
Salt or Alkali: None
Erosion: Slight, primarily wind
Sampled by: R. C. Accola, J. I. Brubacher, R. B. Grossman, R. Moreland, E. M. Payne, and J. L. Walker: July 9, 1963
Described by: J. I. Brubacher

Horizon and
Lincoln
Lab. No.

Ap1
18505 0 to 6 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loamy sand; weak fine granular; soft dry, very friable when moist; noncalcareous; clear smooth boundary.

Ap2 6 to 10 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) sandy loam; moist; noncalcareous; thin nearly continuous clay skins; clear smooth boundary.

B2t
18507 10 to 18 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) sandy loam; weak medium prismatic breaking to weak medium subangular blocky structure; slightly hard dry, friable when moist; noncalcareous; clear smooth boundary.

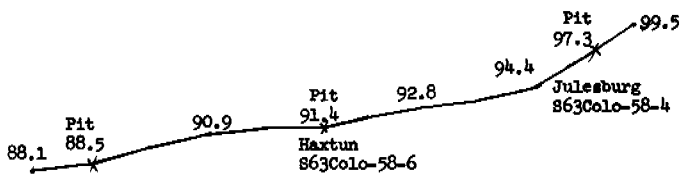
B3
18508 18 to 32 inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) sandy loam; massive breaking to weak medium subangular blocky structure; slightly hard dry, friable when moist; noncalcareous; clear smooth boundary.

C1
18509 32 to 46 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) loamy sand; massive; soft dry, very friable when moist; noncalcareous; clear smooth boundary.

C2
18510 46 to 61 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) loamy sand; massive; soft dry, very friable when moist; noncalcareous; clear smooth boumdary.

C3
18511 61 to 76 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) loamy sand; massive; soft dry, very friable when moist; noncalcareous.

Landscape Profile:



SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Keith silt loam SOIL Nos. 863Colo-58-11 LOCATION Sedgwick County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18553-18561 March 1967

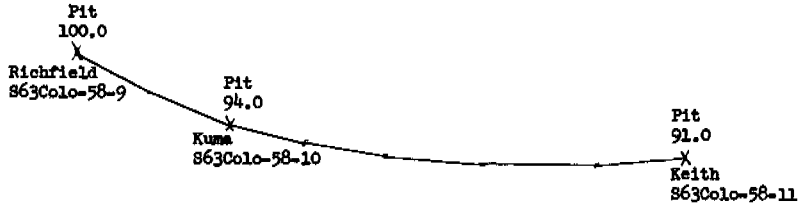
General Methods: 1A, 1B1b, 2A1, 2B

Soil Type: Keith silt loam
Soil Nos.: S63Colo-58-11
Location: 940 feet north, 528 feet west of southeast corner, Sec. 11, T10S, R45W, Sedgwick County, Colorado
Climate: Continental climate, average annual precipitation of 17.5 inches, frost-free season of 147 days, mean annual temperature of 49.6 degrees F.
Elevation: 3,800 feet
Vegetation: Cultivated
Parent Material: Loess
Physiographic Position: Upland
Relief: Concave, 1.5 percent slope
Drainage: Well drained
Moisture: Moist to 23 inches, nearly dry below
Salt or Alkali: None
Erosion: Slight
Sampled by: R. C. Accola, J. I. Brubacher, R. B. Grossman, R. Moreland, E. M. Payne, and J. L. Walker: July 11, 1963
Described by: J. I. Brubacher

Horizon and Lincoln Lab. No.	
Ap1 18553	0 to 5 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loam; weak fine granular structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.
Ap2 18554	5 to 7 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loam; moderate coarse platy structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.
AB 18555	7 to 11 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loam; weak coarse prismatic breaking to weak coarse subangular blocky structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.
B21t 18556	11 to 16 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loam; weak medium prismatic structure breaking to weak medium subangular blocky structure; soft dry, very friable when moist; noncalcareous; very thin patchy clay skins; clear smooth boundary.
B22t 18557	16 to 23 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) heavy loam; moderate medium prismatic breaking to moderate medium subangular blocky structure; soft dry, very friable when moist; noncalcareous; thin continuous clay skins; clear smooth boundary.
B3ca 18558	23 to 27 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) loam; weak medium prismatic structure breaking to weak medium subangular blocky structure; soft dry, very friable when moist; slightly calcareous; clear smooth boundary.
C1ca 18559	27 to 38 inches. Light gray (10YR 7/2 dry) to grayish brown (10YR 5/2 moist) loam; massive to weak coarse prismatic structure; soft dry, very friable when moist; highly calcareous; clear smooth boundary.
IIC2ca 18560	38 to 54 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) very fine sandy loam; massive; soft dry, very friable when moist; highly calcareous; clear smooth boundary.
IIC3ca 18561	54 to 72 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) very fine sandy loam; massive; soft dry, very friable when moist; highly calcareous; clear smooth boundary.

Landscape Profile:

Horizontal Scale: 200 feet
Vertical Scale: 10 feet



Bureau of Public Roads Samples: Ap1, B22t, and C1ca horizons.

Mineralogy (Methods 7A1, 7A2): Ap1, B22t, B3ca, and IIC2ca horizons. Small amounts of kaolinite and mica (or illite) are present in the coarse clay (0.2-2μ) throughout the profile. The crystalline quality decreases in the lower lithic zone. Montmorillonite increases steadily from a small amount in the surface to an abundant amount in the B3ca, then decreases to a moderate amount in the IIC2ca. The fine clay is X-ray amorphous in the surface and below the lithic contact. A small amount of montmorillonite is present in the B22t and a little more in the B3ca. The crystalline quality is poor. A large proportion of X-ray amorphous material is present, especially in the fine clay. Some of this may be closely associated with montmorillonite.

Mineralogy (Method 7E1): AB horizon. Count on very fine sand: 40 percent quartz; 40 percent feldspar; 10 percent compound grains; 10 percent glass shards; accessories include green hornblende; mica group; epidote, garnet, pyroxene group. Orthoclase and albite are common feldspars with a lesser proportion of oligoclase-andesine and some microcline. Compound grains include both altered microcrystalline feldspar and highly altered glass shards.

IIC2ca horizon: 30 percent quartz; 35 percent feldspar; 15 percent compound grains; 15 percent glass shards; accessories include as described for AB plus occasional grains of primary carbonate, and a very few apatite grains. Many of the glass shards show alteration, perhaps a higher proportion than in AB.

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Kettle sandy loam SOIL Nos. S63Colo-18-1 LOCATION Douglas County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18638-18646 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: Very coarse (2–1)	Coarse (1–0.5)	Medium (0.5–0.25)	Fine (0.25–0.1)	Very fine (0.1–0.05)	Silt (0.05–0.02)	Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	(2–0.1)	3A1b <0.0002	2A2 Coarse fragments c: 3B1 > 2 (< 19) Pct.	3B2 > 2 (Vol. <19") Pct.	
		Pct. of < 2 mm															
2-0	O1														7		
0-3	A1	71.0	22.2	6.8	18.0	18.2	10.5	15.7	8.6	11.9	10.3	28.4	62.4		27	17	
3-8	A21	75.0	18.8	6.2	21.9	20.1	10.5	15.1	7.4	9.5	9.3	24.3	67.6		32	20	
8-20	A22	84.0	11.8	4.2	24.0	23.5	12.8	17.4	6.3	6.7	5.1	21.1	77.7		35	23	
20-38	B21t	64.8	16.2	19.0	16.0	11.9	7.0	16.8	13.1	8.7	7.5	31.9	51.7		23	14	
38-46	B22t	48.4	25.7	25.9	6.1	6.6	4.4	14.2	17.1	14.0	11.7	40.5	31.3		7	4	
46-60	C	77.7	10.4	11.9	14.4	14.2	10.7	25.0	13.4	6.8	3.6	34.8	64.3	7.1	41	28	
20-38	a	74.8	12.0	13.2	21.3	15.8	9.0	17.9	10.8	6.9	5.1	27.6	64.0	6.5	35		
20-38	b	42.4	26.0	31.6	6.9	5.4	3.8	13.1	13.2	12.6	13.4	34.1	29.2	17.3	3		

Depth (In.)	6A1a Organic carbon d Pct.	6B1a Nitrogen Pct.	C/N	6C2a Ext. Iron as Fe Pct.	Carbonate as $CaCO_3$ Pct.	Bulk density: 4A1a Field State g/cc	4A1g 1/10-Bar e g/cc	4A1g 1/10-Bar g/cc	4A1b Air Dry g/cc	4D1 COLE	Water content: 4B4 Field State Pct.	4B1c 1/10-Bar Pct.	4B2 15-Bar Pct.	4C2 1/10- to 15-Bar m/in.	pH	8C1a (1:1)
2-0	19.4	1.20	16													
0-3	1.66	0.117	14	0.2		1.48	1.21	1.46	1.47	0.002	11.2	18.1	5.0	0.16		5.5
3-8	0.68	0.050	14	0.2		1.43	1.13	1.41	1.42	0.002	9.3	16.6	3.7	0.14		6.0
8-20	0.23	0.020		0.1		1.55	1.16	1.50	1.51	0.002	4.1	10.1	2.4	0.09		6.3
20-38	0.20			0.2		1.57	1.27	1.48	1.55	0.015	6.7	18.3	6.9	0.15		6.3
38-46	0.20			0.2		1.56	1.39f	1.45f	1.57	0.027	7.7	20.3g	10.0	0.14h		6.0
46-60	0.08			0.1		1.54	1.07	1.48	1.53	0.007	4.3	18.7	4.6	0.15		6.0
20-38	0.17			0.1									4.7			6.1
20-38	0.28			0.3									10.3			6.1

Depth (In.)	Extractable bases 6N2a Ca	6O2a Mg	6P2a Na	5B1a 6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap. 5A3a Sum Cations	5A1a NH_4OAc	8D3 Ca/Mg	Base saturation 5C3 Sum Cations	5C1 NH_4OAc
	meq/100 g									Pct.	Pct.
2-0											
0-3	5.9	1.4	tr	0.4	7.7	5.1	12.8	9.4	4.2	60	82
3-8	4.3	1.0	tr	0.4	5.7	2.1	7.8	6.0	4.3	73	95
8-20	2.3	0.6	tr	0.2	3.1	1.3	4.4	3.0		70	103
20-38	9.2	2.9	0.1	0.2	12.4	1.4	13.8	11.7	3.2	90	106
38-46	13.1	4.7	0.2	0.3	18.3	1.8	20.1	16.9	2.8	91	108
46-60	6.2	2.5	0.1	0.1	8.9	1.0	9.9	7.8	2.5	90	114
20-38	6.2	2.3	0.1	0.2	8.8	0.8	9.6	8.1	2.7	92	109
20-38	15.3	4.5	0.1	0.3	20.2	2.4	22.6	19.3	3.4	89	105

Depth (In.)	Ratios to Clay 8D1: NH_4OAc CEC	Ext. Iron	15-Bar Water
2-0			
0-3	1.38	0.03	0.74
3-8	0.97	0.03	0.60
8-20	0.71	0.02	0.57
20-38	0.62	0.01	0.36
38-46	0.65	0.01	0.39
46-60	0.66	0.01	0.39
20-38	0.61	0.01	0.36
20-38	0.61	0.01	0.33

a. Sandy interband material, see description.
b. Clayey interband material, see description.
c. Estimated less than 10 percent by volume of coarse fragments greater than 19 mm.
d. 5 kg/m^2 from 0 to 60 inches (Method 6A).
e. Calculated to include volume but not weight of 2-19 mm. material (Method 3B2).
f. 1/3-Bar (Method 4A1d).
g. 1/3-Bar.
h. 1/3- to 15-Bar (Method 4C1).

Soil Type	:	*Kettle sandy loam
Soil Nos.	:	S63Colo-18-1
Location	:	425 feet north, 650 feet west of the southeast corner, Section 14, T10S, R67W, Douglas County, Colorado
Climate	:	Continental, average annual precipitation 20 inches, mean annual temperature 44 degrees F. Growing season 120 days. Elevation 7,200 feet.
Vegetation	:	Ponderosa pine with site index of 48, scrub oak, blue grama, wild rose, some mountain muhly and annuals
Parent Material	:	Dawson arkose or outwash from Dawson.
Physiographic Position	:	Upland
Relief	:	Sloping 5 to 6 percent north facing. Slope about 900 feet in length. Pit dug approximately midway on the slope
Drainage	:	Surface and internal drainage gradual. Rapid intake rate
Moisture	:	Dry throughout, usually moist
Stoniness	:	5 to 15 percent very fine gravel throughout the profile
Salt or Alkali	:	None observed
Erosion	:	Slight to none
Sampled by	:	R. K. Dansdill, J. B. Brown, L. G. Shields, and R. H. Jordan; August 12, 1963
Described by	:	J. B. Brown

Horizon and Lincoln Lab. No.	
O1 18638	2 to 0 inches. Pine needles and cones, partially decomposed; abrupt smooth boundary.
A1 18639	0 to 3 inches. Black (10YR 2/1 moist) light coarse sandy loam; very dark gray (10YR 3.5/1 dry); weak medium subangular blocky structure; slightly hard when dry, loose when moist; few fine water washed gravels; noncalcareous; clear wavy boundary.
A21 18640	3 to 8 inches. Dark grayish brown (10YR 4/2 moist) loamy coarse sand; light brownish gray (10YR 6/2 dry); massive structure; slightly hard when dry, loose when moist; noncalcareous; few fine water worn gravels; clear wavy boundary.
A22 18641	8 to 20 inches. Pale brown (10YR 6/3 moist) coarse sand; light gray (10YR 7/2 dry); massive structure; loose when dry or moist; noncalcareous; few fine water worn gravels; abrupt wavy boundary.
B21t 18642	20 to 38 inches. Brown (10YR 5/3 moist and crushed) sandy loam; pale brown (10YR 6/3 dry); extremely hard when dry, friable when moist; this horizon consists of horizontal bands of clay loam or sandy clay loam 1/2 to 1-1/2 inches in width that have a moderate fine angular blocky structure; the finer textured bands are separated by layers of sand 4 to 8 inches thick that are massive; the finer textured bands have clay films and organic staining; some fine gravel is mixed with the sand; noncalcareous; clear slightly wavy boundary.
B22t 18643	38 to 46 inches. Grayish brown (2.5Y 5/2 moist and crushed) coarse sandy loam; light brownish-gray (2.5Y 6/2 dry); very hard when dry, friable when moist; this horizon is similar to the one above; sandy clay loam bands are 1/2 to 1 inch in width and 6 to 12 inches apart; structure is less pronounced but clay films are evident; sand coatings on the bands are not as thick in this horizon; areas between the bands are coarse loamy sand or sand; noncalcareous; gradual boundary.
C 18644	46 to 60 inches. Pale yellow (2.5Y 7/4 moist) coarse sand; pale yellow (2.5Y 8/4 dry); single grain; loose when dry or moist; noncalcareous; a few bands 1/4 inch wide of sandy clay loam materials are present in this layer; the bands may be considered part of the B horizon rather than a C horizon.
B21t 18645	20 to 38 inches. Coarse textured bands. Pale brown (10YR 6/3, moist) coarse loamy sand, very pale brown (10YR 7/3, dry); this is sandier material between the heavy streaks of the B21 horizon; it was sampled separately; structure is massive; hard when dry, loose when moist.
B21t 18646	20 to 38 inches. Fine textured bands. Dark brown (10YR 4/3, dry or moist) sandy clay loam; this is the heavier streaks in the B21 horizon; it is moderate to fine angular blocky with definite clay films and what appears to be organic staining; the heavier material was sampled separately for laboratory analysis.

Remarks: This soil unit is extensive in Douglas County. The parent material may be cut-wash off of the Dawson formation or may be part of the Dawson. The banding as described in this profile is very typical of this soil unit. The coarse sandy material is often cemented and is extremely hard when dry but loose when moist. This soil unit occurs at elevations of 6,400 to 7,800 feet in the survey area. Soil temperatures at this location were 15 degrees centigrade at one foot, 14 degrees centigrade at 3 feet, 12.4 degrees centigrade at 5 feet, 9 degrees centigrade at 13 feet. Very hard Dawson formation was encountered at 13 [illegible]

[redacted]

Bureau of Public Roads Samples: A22 and B21t horizons.

Mineralogy:

Observations on very fine sand (Method 7B1)--A1, B22t, and C horizons: 80 to 90 percent feldspar, 10 percent [illegible] and 5 percent accessory minerals. Orthoclase is the dominant feldspar; microcline and low-calcium plagio-

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Kettle sandy loam SOIL Nos. S63Colo-18-2 LOCATION Douglas County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18647-18652 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			2A2 Coarse fragments a: 3B1 > 2 (< 19) Pct.	3B2 > 2 (Vol. < 19) Pct.	
		Pct. of < 2 mm																
0-3	A1	69.6	23.9	6.5	18.9	15.1	9.0	15.9	10.7	12.4	11.5	31.8	58.9			27	13	
3-9	A21	75.8	20.0	4.2	21.1	18.5	9.8	16.3	10.1	10.3	9.7	29.3	65.7			25	15	
9-17	A22	78.6	14.3	7.1	23.7	18.5	10.0	17.2	9.2	8.0	6.3	26.5	69.4			34	22	
17-26	B21t	75.8	9.7	14.5	17.3	18.1	11.4	20.1	8.9	6.0	3.7	25.7	66.9			32	22	
26-36	B22t	76.9	8.5	14.6	23.5	18.6	10.2	17.7	6.9	4.8	3.7	21.1	70.0			28	26	
36-60	B3	81.6	8.6	9.8	18.3	24.2	14.6	18.1	6.4	4.6	4.0	19.7	75.2			40	27	

Depth (In.)	6A1a Organic carbon b Pct.	6B1a Nitrogen Pct.	C/N	Ext. Iron as Fe Pct.	Carbonate as $CaCO_3$ Pct.	Bulk density: 4A1a Field State g/cc	4A1g 1/10-Bar c g/cc	4A1g 1/10-Bar g/cc	4A1b Air Dry g/cc	4D1 COLE	Water content: 4B4 Field State Pct.	4B1c 1/10-Bar Pct.	4B2 15-Bar Pct.	4C2 1/10-to 15-Bar in./in.		pH:		8C1a (1:1)
0-3	3.48	0.159	22			1.13	0.97	1.12	1.14	0.006	19.4	30.1	5.1	0.24				5.8
3-9	0.95	0.047	20			1.37	1.16	1.36	1.36	-	5.9	12.4	2.2	0.12				5.8
9-17	0.10					1.59	1.21	1.55	1.56	0.002	4.9	8.6	2.2	0.08				6.0
17-26	0.16					1.63	1.22	1.57	1.61	0.005	6.2	11.4	4.8	0.08				6.0
26-36	0.08					1.56	1.12d	1.51d	1.59	0.013	7.7	11.0e	6.0	0.06f				6.0
36-60	0.12					1.53	1.09	1.49	1.49	-	9.7	12.4	4.4	0.09				6.0

Depth (In.)	Extractable bases: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	5B1a Sum	6H1a Ext. Acidity	Cat. Exch. Cap.: 5A3a Sum Cations	5A1a NH_4OAc	8D3 Ca/Mg	Base saturation: 5C3 Sum Cations Pct.	5C1 NH_4OAc Pct.
	meq/100 g										
0-3	10.3	1.6	-	0.4	12.3	8.0	20.3	14.7	6.4	61	84
3-9	3.8	0.7	-	0.2	4.7	3.0	7.7	5.4		61	87
9-17	2.1	0.7	tr	0.3	3.1	1.0	4.1	3.1		76	100
17-26	4.5	1.7	-	tr	6.2	2.0	8.2	6.5	2.6	76	95
26-36	5.5	2.2	tr	0.3	8.0	1.8	9.8	8.0	2.5	82	100
36-60	4.0	1.6	tr	0.2	5.8	1.4	7.2	5.7	2.5	81	102

Depth (In.)	Ratios to Clay: 8D1 NH_4OAc CEC	8D1 15-Bar Water
0-3	2.26	0.78
3-9	1.29	0.52
9-17	0.44	0.31
17-26	0.45	0.33
26-36	0.55	0.41
36-60	0.58	0.45

a. Estimated less than 10 percent by volume of coarse fragments greater than 19 mm.
b. 6 kg/m^2 from 0-60 inches (Method 6A).
c. Calculated to include volume but not weight of 2-19 mm. material (Method 3B2).
d. 1/3-Bar (Method 4A1d).
e. 1/3-Bar.
f. 1/3- to 15-Bar (Method 4C1).

Soil Type : *Kettle sandy loam
Soil Nos. : S63Colo-18-2
Location : 550 feet west, 150 feet north of the southeast corner of Section 34, T10S, R66W, Douglas County, Colorado
Climate : Continental, average annual precipitation 20 inches, mean annual temperature 44 degrees F. Growing season 120 days. Elevation 7,250 feet
Vegetation : Ponderosa pine, with a site index of 62; older stand with understory of some mountain muhly.

[redacted]

Parent Material : Dawson arkose or outwash from Dawson
Physiographic Position : Upland
Relief : Sloping, 5 percent northwest facing slope. Slope about 300 feet in length; pit dug near the base of the slope
Drainage : Surface and internal drainage gradual; rapid intake rate
Moisture : Dry throughout, usually moist
Stoniness : 5 to 15 percent fine gravel throughout this profile
Salt or Alkali : None observed
Erosion : Slight to none
Sampled by : R. K. Dansdill, J. B. Brown, R. H. Jordan, and L. G. Shields; August 12, 1963
Described by : J. B. Brown

Horizon and Lincoln Lab. No.

O1 — 1 to 0 inches. Pine needles and cones, partially decomposed; abrupt smooth boundary.

A1 18647 — 0 to 3 inches. Black (10YR 2/1 moist) coarse loamy sand; dark gray (10YR 4/1 dry); weak coarse subangular blocky structure; loose when dry or moist; noncalcareous; few fine water worn gravels;

[redacted]

clear wavy boundary.

A21 18648 — 3 to 9 inches. Dark gray (10YR 4/1 moist) loamy sand; gray (10YR 6/1 dry); massive structure; loose when dry or moist; noncalcareous; few fine water worn gravels; clear slightly wavy boundary.

A22 18649 — 9 to 17 inches. Light gray (10YR 7/2 moist) sand; white (10YR 8/1 dry); massive structure; loose when dry or moist; noncalcareous; some fine gravels; abrupt wavy boundary.

B21t 18650 — 17 to 26 inches. Pale brown (10YR 6/3 moist) coarse loamy sand; very pale brown (10YR 7/3 dry); moderate medium to coarse angular and subangular blocks; extremely hard when dry, loose when moist; noncalcareous; thin nearly continuous clay films; bands of coarse sandy loam 1/4 to 1 inch thick with structure and clay films are common; massive coarse sand or gravelly sand 1 to 2 inches thick separate the finer textured bands; color of the coarse sandy loam layer is brown (10YR 5/3 moist or dry); gradual smooth boundary.

B22t 18651 — 26 to 36 inches. Pale brown (10YR 6/3 moist) coarse sandy loam; very pale brown (10YR 7/3 dry); moderate medium angular and subangular blocky structure; extremely hard when dry, very friable when moist; noncalcareous; thin patchy clay films; coarse sandy clay loam bands 1/2 to 2 inches thick and 2 to 4 inches apart are common; between these layers are coarse sand or gravelly sand materials; color of the sandy clay loam material is brown (10YR 5/3 moist or dry).

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Kettle sandy loam, thick surface phase SOIL Nos. 863Colo-18-9 LOCATION Douglas County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18653-18661 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1											3A1b		2A2 Coarse fragments b	
		Total			Sand					Silt					3B1	3B2
		Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Very coarse (2–1)	Coarse (1–0.5)	Medium (0.5–0.25)	Fine (0.25–0.1)	Very fine (0.1–0.05)	0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	<0.0002	> 2 (< 19) Pct.	> 2 (Vol., < 19) Pct.
		Pct. of < 2 mm														

Soil Type	:	*Kettle sandy loam, thick surface phase
Soil Nos.	:	S63Colo-18-9
Location	:	1,320 feet west, 85 feet north of the east quarter corner of Section 28, T10S, R66W, Douglas County, Colorado
Climate	:	Continental, average annual precipitation 20 inches, mean annual temperature 44 degrees F. Growing season 120 days. Elevation 7,200 feet
Vegetation	:	Native pasture; mountain muhly, blue grama, western wheat grass, gamble oak and mountain mahogany
Parent Material	:	Dawson arkose or outwash from the Dawson
Physiographic Position	:	Upland
Relief	:	Sloping, 8 percent west facing slope. Slope about 200 feet long; grades toward small drainageway with pit near the base of the slope
Drainage	:	Surface drainage rapid; internal drainage rapid to 3 feet, extremely slow below 3 feet. Intake rate rapid
Moisture	:	Moist to 16 inches, dry below; usually moist throughout
Stoniness	:	Fine gravel throughout, increasing below 16 inches; mainly feldspar and quartz that have been rounded
Salt or Alkali	:	None observed.
Erosion	:	Slight to none
Sampled by	:	R. K. Dansdill, J. B. Brown, R. H. Jordan, and L. G. Shields; August 16, 1963
Described by	:	J. B. Brown

Horizon and Lincoln Lab. No.	
A1 18653	0 to 6 inches. Black (10YR 2/1 moist) light sandy loam; dark grayish brown (10YR 4/2 dry); weak fine granular structure; slightly hard when dry, very friable to loose when moist; noncalcareous; few fine water worn gravels; clear wavy boundary.
A1&A2 18654	6 to 11 inches. Very dark gray (10YR 3/1 moist and mixed) loamy sand; this horizon is a mixture of light and dark bands 2 to 6 inches wide; the dark bands are (10YR 2/1 moist) and (10YR 4/1 dry); the light bands are (10YR 6/2 dry) and (10YR 4/2 moist); massive structure; loose when dry or moist; noncalcareous; few fine water worn gravels; clear smooth boundary.
A2 18655	11 to 16 inches. Grayish brown (10YR 5/2 moist) loamy sand; light gray (10YR 7/2 dry); massive structure; loose when dry or moist; noncalcareous; some fine water worn gravel; abrupt smooth boundary.
B2&A2 18656	16 to 19 inches. Light brownish gray (10YR 6/2 moist and crushed) gravelly sandy loam; light gray (10YR 7/2 dry); moderate medium to fine subangular blocky structure; very hard when dry, firm when moist; noncalcareous; thin patchy clay films on ped surfaces; this horizon consists of sandy clay loam nodules with coats of sand from the A2 horizon on the outside; colors in the pit indicate this may be a B2ir horizon; clear smooth boundary.
B21t	19 to 24 inches. Light brownish gray (10YR 6/2 moist and crushed) gravelly clay loam; dark grayish

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Kuma loam SOIL Nos. S63Colo-58-7 LOCATION Sedgwick County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18562-18570 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2 (< 19)	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-6	Ap	25.6	54.8	19.6	0.6	2.9	2.6	3.7	15.8	32.4	22.4	50.2	9.8			tr		
6-11	B21t	25.0	50.7	24.3	1.0	3.3	2.7	3.7	14.3	31.3	19.4	47.6	10.7			tr		
11-16	B22t	24.3	49.0	26.7	1.3	4.5	3.3	3.9	11.3	30.1	18.9	43.4	13.0			2		
16-22	B21tb	27.5	44.7	27.8	1.7	6.1	4.4	4.3	11.0	25.6	19.1	38.8	16.5			2		
22-29	B22tb	25.1	45.9	29.0	1.5	4.7	3.3	3.6	12.0	26.9	19.0	40.8	13.1			2		
29-34	B3b	21.8	50.0	28.2	1.2	3.0	2.1	2.1	13.4	30.2	19.8	44.8	8.4			tr		
34-44	C1cab	31.4a	51.3	17.3	1.4	3.9	3.0	3.8	19.3	30.6	20.7	52.0	12.1			5		
44-52	IIC2cab	89.4	4.3	6.3	13.4	33.5	24.8	13.3	4.4	2.7	1.6	11.6	85.0			26		
52-84	IIIR2cab	54.8a	8.0	37.2	10.8	12.7	9.2	12.8	9.3	4.7	3.3	20.3	45.5			11		

Depth (In.)	6A1a Organic carbon b	6B1a Nitrogen	C/N	Carbonate as $CaCO_3$: 6B1b 6B2a <2 mm	3A1a <0.002 mm.	Ext. Iron as Fe	Bulk density: 4A1a Field State	4A1d 1/3-Bar	4A1b Air Dry	4D1 COLE	Water content: 4B4 Field State	4B1c 1/3-Bar	4B2 15-Bar	4C1 1/3- to 15-Bar	Field Capacity d	pH: 8C1b Sat. Paste	8C1a (1:1)
	Pct.	Pct.		Pct.	Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct.	Pct.	in./in.	Pct.		
0-6	1.40	0.134	10				1.24	1.24	1.28	0.010	23.8	23.1	10.2	0.16	26.4		6.4
6-11	0.74	0.089	8				1.30	1.26	1.36	0.024	20.2	24.8	11.4	0.17	26.1		6.7
11-16	0.74	0.080	9	-(s)				1.3c					12.9		24.6		7.0
16-22	0.90	0.089	10	-(s)			1.45	1.33	1.47	0.036	10.2	23.7	12.8	0.14	23.2		7.1
22-29	0.98	0.094	10	-(s)				1.3c					13.5		22.8		7.3
29-34	0.60	0.070	9	tr(s)	-		1.39	1.30	1.40	0.024	10.8	24.6	13.0	0.15	25.3	7.2	7.7
34-44	0.34			3	tr		1.39	1.34	1.39	0.014	8.5	21.9	10.1	0.16	26.0		8.3
44-52	0.03			tr	-								3.1				8.5
52-84	0.02			2	tr								17.2				8.0

Depth (In.)	Extractable bases: 6N2a Ca	6O2a Mg	6P2a Na	5B1a 6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap.: 5A3a Sum Cations	5A1a NH_4OAc	8A Water at Saturation Pct.	8A1a Elec. Cond.	8D3 Ca/Mg	Base saturation: 5C3 Sum Cations	5C1 NH_4OAc
	meq/100 g									mmho/cm		Pct.	Pct.
0-6	9.8	2.6	tr	2.5	14.9	5.7	20.6	15.7			3.8	72	95
6-11	12.1	3.4	0.1	1.6	17.2	4.4	21.6	17.5			3.6	80	98
11-16	13.7	4.4	0.1	1.7	19.9	3.9	23.8	19.3			3.1	84	103
16-22	16.0	4.9	0.1	1.9	22.9	2.9	25.8	20.9			3.3	89	110
22-29	16.8	5.5	0.1	2.3	24.7	2.2	26.9	22.3			3.1	92	111
29-34	16.4 e	6.3f	0.2	2.7	25.6			23.1	47.0	0.68	2.6		
34-44	13.5 e	5.6f	0.5	2.6	22.2			18.8			2.4		
44-52	3.8 e	1.3f	0.2	0.6	5.9			5.1			2.9		
52-84	20.0 e	6.6f	1.5	2.7	30.8			26.0			3.0		

Depth (In.)	Ratios to Clay 8D1: NH_4OAc CEC	Ext. Iron	15-Bar Water
0-6	0.80		0.52
6-11	0.72		0.47

a. Trace of carbonate grains (1-0.05 mm.).
b. 11 kg/m² to 44 inches (Method 6A).
c. Estimated.
d. Field capacity estimates: A spade-width ditch about 6 inches deep was dug around a 3x3 foot square and the soil banked up to the outside to form a dam. About 200 gallons of water were applied the morning of 7/10/63. On 7/12/63 a pit was dug that cut across the interior square; the boundaries were delimited on three sides for the above profile and

Soil Type: Kuma loam
Soil Nos.: S63Colo-58-7
Location: 680 feet east, 135 feet north of south quarter corner, Sec. 19, T10N, R44W, Sedgwick County, Colorado
Climate: Continental climate, average annual precipitation of 17.5 inches, frost-free season of 147 days, mean annual temperature of 49.6 degrees F.
Elevation: 3,800 feet
Vegetation: Grass
Parent Material: Loess
Physiographic Position: Upland
Relief: 1 percent slope
Drainage: Well drained
Moisture: Moist to 20 inches, nearly dry below
Salt or Alkali: None
Erosion: Slight
Sampled by: R. C. Accola, J. I. Brubacher, R. B. Grossman, R. Moreland, E. M. Payne, and J. L. Walker: July 10, 1963
Described by: J. I. Brubacher

Horizon and Lincoln Lab. No.

Ap 18562 — 0 to 6 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) and very dark brown (10YR 2/2 crushed) loam; weak fine granular structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary. Weak fine platy structure in lower 2 inches.

B21t 18563 — 6 to 11 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loam; weak coarse prismatic breaking to weak medium subangular blocky structure; hard dry, friable when moist; noncalcareous; clear smooth boundary.

B22t 18564 — 11 to 16 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) and very dark brown (10YR 2/2 crushed) clay loam; moderate medium prismatic breaking to moderate fine subangular blocky structure; slightly hard dry, friable when moist; noncalcareous; thin patchy clay skins; clear smooth boundary; streaks of very dark brown (10YR 2/2 moist) color; clear smooth boundary.

B21tb 18565 — 16 to 22 inches. Dark gray (10YR 4/1 dry) to black (10YR 2/1 moist) clay loam; strong medium prismatic breaking to strong fine subangular blocky structure; slightly hard dry, friable when moist; noncalcareous; thin continuous clay skins; clear smooth boundary.

B22tb 18566 — 22 to 29 inches. Dark gray (10YR 4/1 dry) to black (10YR 2/1 moist) clay loam; strong medium prismatic breaking to strong fine subangular blocky structure; slightly hard dry, friable when moist; noncalcareous; clear smooth boundary.

B3b 18567 — 29 to 34 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) loam; moderate medium prismatic breaking to moderate medium subangular blocky structure; slightly hard dry, very friable when moist; noncalcareous; 10 percent of horizon has streaks of very dark grayish brown (10YR 3/2 moist) color; clear smooth boundary.

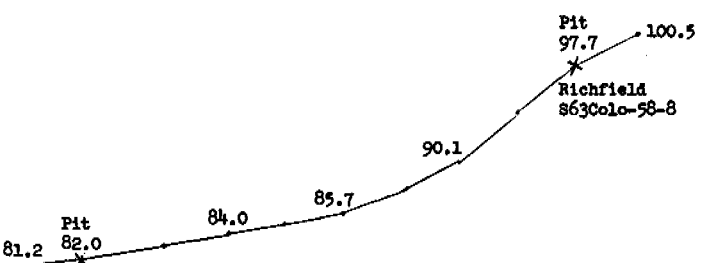
C1cab 18568 — 34 to 44 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) loam; weak medium prismatic breaking to weak medium subangular blocky structure; slightly hard dry, very friable when moist; highly calcareous; clear smooth boundary.

IIC2cab 18569 — 44 to 52 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) coarse sand and gravel; single grain structure; loose dry and moist; slightly calcareous; 30 percent fine gravels; clear wavy boundary.

IIIB2cab 18570 — 52 to 84 inches. Dark brown (7.5YR 4/4 dry) to brown (7.5YR 5/4 moist) sandy clay loam; weak coarse prismatic breaking to weak coarse subangular blocky structure; slightly hard dry, friable when moist; slightly calcareous with a horizontal 2-inch lime streak at 66 inches; clear wavy boundary.

IIIB3b — 84 to 124 inches. Dark brown (7.5YR 4/4 dry) to brown (7.5YR 5/4 moist) sandy loam; massive; slightly hard dry, friable when moist; noncalcareous.

Landscape Profile:



SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Kuma loam SOIL Nos. S63Colo-58-10 LOCATION Sedgwick County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18571-18580 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) Total Sand (2–0.05) a	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	3A1 (2–0.1)	3A1b <0.0002	3A1a Noncarbonate Clay <0.002	Coarse fragments 2A2: > 2 (< 19) Pct.	2 – 19 Pct. of < 76mm	19 – 76 Pct. of < 76mm
		Pct. of < 2 mm																
0-5	Ap1	35.9	44.4	19.7	1.4	4.9	4.9	8.0	16.7	27.6	16.8	48.6	19.2		20	tr		
5-7	Ap2	33.4	44.0	22.6	1.2	4.8	4.5	7.0	15.9	28.8	15.2	48.4	17.5		23	tr		
7-13	B2t	24.5	46.8	28.7	0.7	2.9	2.8	5.0	13.1	27.1	19.7	42.9	11.4	19.9	29	tr		
13-24	B21tb	20.8	47.8	31.4	0.6	2.0	2.2	3.7	12.3	26.0	21.8	40.2	8.5		31	tr		
24-31	B22tb	21.7	50.2	28.1	0.6	2.0	1.9	3.2	14.0	28.3	21.9	44.1	7.7	9.2	28	tr		
31-40	B3cab	22.9	55.4	21.7	0.5	1.5	1.7	3.0	16.2	32.0	23.4	49.7	6.7		22	tr		
40-47	C1cab	36.9	46.7	16.4	1.6	4.3	4.2	6.8	20.0	28.6	18.1	52.2	16.9		16	1		
47-51	C2cab	46.7	36.9	16.4	2.1	6.8	6.9	11.4	19.5	23.1	13.8	48.5	27.2		16	5		
51-69	IIC3cab	66.7	14.1	19.2	4.4	10.6	12.6	22.4	16.7	6.7	7.4	35.3	50.0	9.4	17	6		
69-85	IIC4cab	69.8	14.3	15.9	4.3	13.5	13.9	22.3	15.8	6.5	7.8	34.0	54.0		15	4		

Depth (In.)	6A1a Organic carbon b Pct.	6B1a Nitrogen Pct.	C/N	Carbonate as $CaCO_3$ 6E1b 6E2a < 2mm Pct.	Carbonate as $CaCO_3$ 3A1a <0.002 mm. Pct.	6C2a Ext. Iron as Fe Pct.	Bulk density 4A1a Field State g/cc	Bulk density 4A1d 1/3-Bar g/cc	Bulk density 4A1b Air Dry g/cc	4D1 COLE	Water content 4B4 Field State Pct.	Water content 4B1c 1/3-Bar Pct.	Water content 4B2 15-Bar Pct.	Water content 4C1 1/3-to 15-Bar in./in.	pH 8C1b Sat. Paste	pH 8C1a (1:1)
0-5	1.20	0.115	10			0.5	1.12c	1.0d					9.4			6.1
5-7	0.93	0.105	9			0.5	1.40	1.36	1.47	0.028	17.4	21.1	10.2	0.15		6.4
7-13	0.66	0.082	8	-(s)		0.5	1.34	1.28	1.42	0.036	16.2	22.4	12.7	0.12		6.9
13-24	1.14	0.108	11	-(s)		0.5	1.33	1.26	1.38	0.032	15.1	24.3	14.6	0.12		7.3
24-31	0.83	0.086	10	tr(s)		0.5		1.3d					13.6			7.8
31-40	0.53			4	tr	0.4	1.34	1.32	1.36	0.010	13.6	21.6	12.3	0.12	7.6	8.1
40-47	0.32			4	tr	0.4	1.34	1.33	1.36	0.007	11.9	18.8	9.6	0.12		8.2
47-51	0.28			3	tr	0.3		1.3d					8.6			8.2
51-69	0.04			12	2	0.2	1.55	1.52	1.56	0.010	12.1	14.3	9.3	0.08		8.4
69-85	0.04			10	1	0.2							7.5			8.5

Depth (In.)	Extractable bases 6N2a Ca	6O2a Mg	6P2a Na	5B1a 6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap. 5A3a Sum Cations	5A1a NH_4OAc	8A Water at Saturation Pct.	8A1a Elec. Cond. mmho/cm	8D3 Ca/Mg	Base saturation 5C3 Sum Cations Pct.	Base saturation 5C1 NH_4OAc Pct.
	meq/100 g												
0-5	9.9	2.5	tr	1.9	14.3	5.0	19.3	15.1			4.0	74	95
5-7	11.5	3.1	tr	1.9	16.5	3.9	20.4	16.3			3.7	81	101
7-13	15.2	4.4	0.1	1.8	21.5	3.0	24.5	21.0			3.5	88	102
13-24	20.0	5.9	0.1	2.3	28.3	2.2	30.5	25.9			3.4	93	109
24-31	18.4 e	6.7f	0.1	2.7	27.9			26.2			2.7		
31-40	15.7 e	6.3f	0.3	2.8	25.1			21.9	45.0	0.57	2.5		
40-47	12.4 e	5.0f	0.4	2.4	20.2			17.7			2.5		
47-51	11.3 e	4.4f	0.5	2.1	18.3			15.4			2.6		
51-69	9.1 e	3.6f	0.7	1.6	15.0			13.3			2.5		
69-85	7.8 e	2.9f	0.7	1.3	12.7			11.1			2.7		

Depth (In.)	Ratios to Clay 8D2 NH_4OAc CEC	8D2 Ext. Iron	8D1 15-Bar Water
0-5	0.76	0.03	0.48
5-7	0.71	0.02	0.45
7-13	0.72	0.02	0.44
13-24	0.84	0.02	0.46
24-31	0.94	0.02	0.48
31-40	1.00	0.02	0.57
40-47	1.11	0.03	0.59
47-51	0.96	0.02	0.52
51-69	0.78	0.01	0.48
69-85	0.74	0.01	0.47

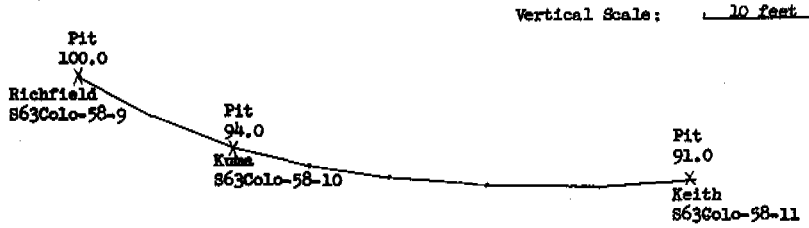
a. Few carbonate grains below 31 inches.
b. 12 kg/m^2 to 60 inches (Method 6A).
c. One clod.
d. Estimated.
e. NH_4Cl-EtOH extraction (Method 6N3a).
f. NH_4Cl-EtOH extraction (Method 6O3a).

Soil Type: Kuma loam
Soil Nos.: S63Colo-58-10
Location: 1,320 feet west, 792 feet north of southeast corner, Sec. 11, T10N, R45W, Sedgwick County, Colorado
Climate: Continental climate, average annual precipitation of 17.5 inches, frost-free season of 147 days, mean annual temperature of 49.6 degrees F.
Elevation: 3,800 feet
Vegetation: Cultivated
Parent Material: Loess
Physiographic Position: Upland
Relief: 2 percent slope
Drainage: Well drained
Moisture: Moist to 20 inches, dry below
Salt or Alkali: None
Erosion: Slight
Sampled by: R. C. Accola, J. I. Brubacher, R. B. Grossman, R. Moreland, E. M. Payne, and J. L. Walker: July 11, 1963
Described by: J. I. Brubacher

Horizon and Lincoln Lab. No.	
Ap1 18571	0 to 5 inches. Grayish brown (10YR 5/2 dry) to very dark brown (10YR 2/2 moist) loam; weak fine granular structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.
Ap2 18572	5 to 7 inches. Dark grayish brown (10YR 4/2 dry) to very dark brown (10YR 2/2 moist) loam; weak coarse platy structure; hard dry, friable when moist; noncalcareous; clear smooth boundary.
B2t 18573	7 to 13 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) clay loam; moderate medium prismatic breaking to moderate medium subangular blocky structure; slightly hard dry, friable when moist; noncalcareous; very thin patchy clay skins; clear smooth boundary.
B21tb 18574	13 to 24 inches. Dark gray (10YR 4/1 dry) to black (10YR 2/1 moist) silty clay loam; moderate medium prismatic breaking to moderate, medium subangular blocky structure; slightly hard dry, very friable when moist; noncalcareous; thin continuous clay skins; clear smooth boundary.
B22tb 18575	24 to 31 inches. Dark gray (10YR 4/1 dry) to black (10YR 2/1 moist) loam; moderate medium prismatic breaking to weak moderate medium subangular blocky structure; slightly hard dry, very friable when moist; noncalcareous; streaks of dark grayish brown (10YR 4/2 moist) colors in 10 percent of horizon; clear smooth boundary.
B3cab 18576	31 to 40 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) loam; weak moderate medium prismatic breaking to weak, moderate medium subangular blocky structure; slightly hard dry, very friable when moist; highly calcareous; clear smooth boundary.
C1cab 18577	40 to 47 inches. Pale brown (10YR 6/3 dry) to dark grayish brown (10YR 4/2 moist) loam; massive; slightly hard dry, very friable when moist; highly calcareous; clear smooth boundary.
C2cab 18578	47 to 51 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) loam; massive; slightly hard dry, very friable when moist; highly calcareous; streaks of very dark grayish brown (10YR 3/2 moist) colors; clear wavy boundary.
IIC3cab 18579	51 to 69 inches. Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) coarse sandy clay loam; massive; slightly hard dry, friable when moist; highly calcareous; 7 percent gravel in horizon; clear wavy boundary.
IIC4cab 18580	69 to 85 inches. Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) sandy clay loam; massive; slightly hard dry, friable when moist; highly calcareous.

Landscape Profile:

Horizontal Scale: 200 feet
Vertical Scale: 10 feet



Bureau of Public Roads Samples: Ap1, B2t, B21tb, and C1cab horizons.

Mineralogy (Methods 7A1, 7A2): B2t, B22tb, and IIC3cab horizons. The profile contains small to moderate amounts of well-crystallized kaolinite and mica. The amount and crystalline quality drop in the lower lithic zone. Montmorillonite increases from a small amount (poorly organized) in the B2t to an abundant amount (well crystallized) in the B22tb. A moderate amount is present in the lower lithic zone.

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Laporte sandy loam **LOCATION** Chaffee County, Coloredo

SOIL NOS. S58Colo-8-9 **LAB. NOS.** 9082-9085

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-3	A11	7.8a	7.4a	7.2a	12.2a	12.1a	33.5	19.8	34.6	18.4	31	1
3-7	A12	7.5a	6.5a	5.9a	10.7a	11.6a	36.1	21.7	33.7	20.6	28	1
7-12	AC	4.9a	5.4a	5.2a	10.8a	13.8a	36.0	23.9	37.2	19.5	27	1
12-21	Cca	5.6b	6.2b	5.3b	12.7b	17.9b	31.6	20.7	42.3	15.4	35	1

DEPTH INCHES	pH 8C1a 1:1	1:5	1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron $\%Fe_2O_3$ 6C1a		6E1a $CaCO_3$ equivalent %		MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
0-3	7.9			3.32	0.207	16	0.8		26				11.7
3-7	7.9			3.50	0.213	16	0.8		20				13.6
7-12	7.9			3.72	0.222	17	0.7		33				18.4
12-21	7.9			4.34	0.218	20	0.5		47				22.3

DEPTH INCHES	5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS Ca	6G2b Mg	6H1a H	6P2a Na	5E1a 6Q2a K	BASE SAT. % NH_4Ac EXCH.	Base Sat. % on Sum Cations	Sum Bases	Sum Cations	Ca/Mg
	← milliequivalents per 100g. soil →										
0-3	20.6		3.7	<0.1	<0.1	1.0					
3-7	23.8		5.5	<0.1	<0.1	0.6					
7-12	22.8		7.4	<0.1	<0.1	0.4					
12-21	22.6		9.7	<0.1	<0.1	0.2					

a. Few irregular light brown to black concr. (Fe-Mn?) Also, few $CaCO_3$ concr.
b. Common $CaCO_3$ concr.

Soil Type: Laporte sandy loam. **Described by: A. J. Cline**
Location: SW¼ of Sec. 33, T13S, R77W, Chaffee County, Colorado.
Date of Sampling: September 1957
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline
Physiographic Position: Mountain slope at an elevation of approximately 9,900 feet.
Topography: Steep convex slope of approximately 30 percent facing south.
Drainage: Well drained.
Vegetation: Mountain fescue, ring muhly, pine, and spruce with a scattered tree cover. Use: National Forest Service land.
Soil Nos.: S58Colo-8-9

Lincoln Lab. No.	Horizon		
9082	A_{11}	0-3 inches	Gray or grayish brown (10YR 5/1.5 dry) to very dark grayish brown (10YR 3/2 moist) gravely sandy loam; soft when dry, very friable when moist; moderate fine granular structure; violently effervescent; approximately 25 percent of this horizon is limestone gravel fragments; lower boundary clear
9083	A_{12}	3-7 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) gravelly sandy loam; soft when dry, very friable when moist; weak fine subangular blocky structure

approximately 25 percent of this horizon is limestone

SOIL SURVEY LABORATORY Lincoln, Nebr. 3/17/58

SOIL TYPE Leal sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. S55Colo-25-3 **LAB. NOS.** 2877-2880

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm.)	
2-0	Ao											
0-2	A2	9.7	6.6	5.0	10.3	11.3	46.8	10.3	39.8	24.3	10	1
2-10	B2ir	11.1	10.0	6.2	11.6	11.8	40.1	9.2	35.4	23.3	13	1
10-23+	C	13.0	12.9	8.8	15.8	13.3	30.6	5.6	36.9	16.1	18	cosl

[redacted]

Soil Type: Leal sandy loam
Soil Nos.: S55Colo-25-3
Location: Approximately the SE 1/4 of the SE 1/4, Sec. 4, T2S, R76W, Grand County, Colorado.
Physiographic Position: Lateral moraine along St. Louis Creek.
Topography: Convex slopes of approximately 10 percent facing east.
Drainage: Well drained.
Vegetation: Lodgepole pine with a moderate ground cover of brush and sedges.
Collected by: James Allen, A. R. Aandahl, John Retzer, E. M. Payne, H. Bindschadler, and A. J. Cline, October 9, 1955.

Horizon and Lincoln Lab. No.	
Aoo	3 to 2 inches. Undecomposed needle mat.
Ao 2877	2 to 0 inch. Very dark gray (10YR 3/1 dry) to black (10YR 2/1 moist) partially decayed organic material; rests abruptly on the horizon below.
A2 2878	0 to 2 inches. Light gray (10YR 7/2 dry) to grayish brown (10YR 5/2 moist) light loam; soft when dry, very friable when moist; very weak very coarse platy structure breaking to weak fine crumbs; strongly acid; lower boundary abrupt and wavy.
B2ir 2879	2 to 10 inches. Light yellowish brown to brownish yellow (10YR 6/5 dry) to yellowish brown (10YR 5/5 moist) gravelly loam; slightly hard when dry, friable when moist; weak to moderate fine subangular blocky structure breaking to weak to moderate very fine subangular blocks; moderately acid; lower boundary gradual and wavy.
C 2880	10 to 23 inches plus. Light gray to pale yellow (2.5Y 7/3 dry) to grayish brown or light olive brown (2.5Y 5/3 moist) gravelly sandy loam; slightly hard when dry, friable when moist; massive; slightly acid to neutral.

SOIL SURVEY LABORATORY Lincoln, Nebr. 3/17/58

SOIL TYPE Leal sandy loam **LOCATION** Grand County, Colorado

SOIL NOS. S55Colo-25-4 **LAB. NOS.** 2881-2885

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
2-0	Ao											
0-2½	A2	18.0	10.7	6.8	11.5	10.0	34.7	8.3	33.9	17.2	16	cosl
2½-11	B21r	17.7	13.0	7.3	11.4	10.2	30.9	9.5	31.5	16.0	18	cosl
11-16	B3	24.7	15.5	7.8	11.5	10.0	23.9	6.6	28.4	11.9	25	cosl
16-34+	C	21.6	16.6	9.4	13.7	10.9	23.2	4.6	30.2	11.5	16	cosl

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6C1a Free Iron Fe_2O_3 %	MOISTURE TENSIONS 4B1a 1/10 ATMOS. %	4B1a 1/3 ATMOS. %	4B2 15 ATMOS. %
4.4			2.52	.076	33	1.0			
5.1			0.66	.031	21	1.2			5.7
5.3			0.17	.012		0.8	15.6	10.5	3.9
5.4			0.09	.009		0.7	14.3	9.2	3.0

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	Base Sat. % on Sum Cations 5C3	5B1a Sum Bases me/100g	5A3a Sum Cations me/100g	Ca/Mg
← milliequivalents per 100g. soil →										
12.7	2.6	0.8	10.8	0.1	0.6	32	28	4.1	14.9	
10.9	2.7	0.8	8.8	0.1	0.3	36	31	3.9	12.7	
7.3	2.5	0.6	4.4	0.1	0.2	46	44	3.4	7.8	
5.7	2.2	0.6	3.1	0.1	0.1	53	49	3.0	6.1	

Soil Type: Leal sandy loam
Soil Nos.: S55Colo-25-4
Location: Near the center of Sec. 9, T2S, R76W, Grand County, Colorado.
Physiographic Position: Upland, small terminal moraine.
Topography: Moderately sloping convex area of about 4 percent gradient, facing east.
Drainage: Well drained.
Vegetation: Principally lodgepole pine.
Use: Forested land.
Collected by: J. Allen, H. Hindschadler, E. M. Payne, J. Retzer, A. J. Cline, August 1955.

Horizon and Lincoln Lab. No.	
Aoo	2½ to 2 inches. A massive undecomposed mat of pine needles and other organic debris.
Ao 2881	2 to 0 inch. Very dark gray (10YR 3/1 dry) to black (10YR 2/1 moist) massive partly decomposed organic material; very strongly acid. The horizon rests abruptly on the horizon below.
A2 2882	0 to 2½ inches. Light gray (10YR 7/2 dry) to grayish brown (10YR 5/2 moist) sandy loam; soft when dry, very friable when moist; weak very coarse platy structure breaking to weak to moderate fine crumbs; strongly acid; lower boundary clear and wavy.
B21r 2883	2½ to 11 inches. Light yellowish brown (10YR 6/4 dry) to dark yellowish brown (10YR 4/4 moist) gravelly sandy loam; soft when dry, very friable when moist; weak to moderate fine subangular blocky structure; strongly acid; lower boundary gradual and smooth.
B3 2884	11 to 16 inches. Light yellowish brown (2.5Y 6/4 dry) to olive brown (2.5Y 4/4 moist) gravelly sandy loam; soft when dry, very friable when moist; very weak medium subangular blocky structure; slightly acid; the horizon contains common numbers of medium-sized distinct 10YR 5/4 mottles; lower boundary gradual and smooth.
C 2885	16 to 23 inches. Pale yellow (2.5Y 7/3 dry) to light olive brown (2.5Y 5/3 moist) gravelly coarse sandy loam; soft when dry, very friable when moist; massive; approximately neutral.

SCS-420
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Little silt loam SOIL Nos. 3C1Colo-2-1 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB Nos. 1S485-1S501 February 1965

Depth (In.)	Horizon	1B1a Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1c Clay: Carbonate	3A1c Clay: Noncarbonate	Coarse fragments 2A2: > 2	Coarse fragments 2A2: 2 – 19	Coarse fragments 2A2: 19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0-3	A1	14.3	57.5	28.2	0.1a	0.4a	0.2	1.2	12.4	28.6	18.9	51.8	1.9	-	28	Tr.		
3-6	B1	9.5	48.5	42.0	-	0.2a	0.2	0.9	8.2	23.1	25.4	31.9	1.3	-	42	Tr.		
6-13	B2	4.5	52.2	43.3	-	0.1a	0.1	0.4	3.9	18.7	33.5	22.9	0.6	1	42	Tr.		
13-23	B3ca	3.8	53.4	42.8	0.1b	0.7b	0.5b	1.0b	1.5b	13.4	40.0	15.4	2.3	Tr.	43	Tr.		
23-31	B1	5.3	54.8	39.9	0.2b	1.1b	1.1b	1.6b	1.3b	14.5	40.3	16.5	4.0	-	40	Tr.		
31-43	B2	0.9	57.8	41.3	0.1b	0.1b	0.1b	0.2c	0.4c	14.3	43.5	14.8	0.5	-	41	Tr.		
43-55	B3	1.4	58.7	39.9	0.3b	0.3b	0.1b	0.2c	0.5c	17.2	41.5	17.8	0.9	-	40	Tr.		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N		6E1c Carbonate as $CaCO_3$	6C1a Ext. Iron as Fe	Bulk density: 4A1c 30-Cm.	Bulk density: 4A1b Air-Dry	4H COLE d	Water content: 4B3 30-Cm.	Water content: 4E1b 1/3-Bar	Water content: 4B2 15-Bar	4C1 1/3- to 15-Bar in. per horizon	8D1 15-Bar Water to Clay Ratio	pH: 8C1b Sat. Paste	pH: 8C1a 1:10	pH: 8C1a (1:1)
	Pct.	Pct.			Pct.	Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.					
0-3	1.78	0.148	12		Tr.	1.0			1.48		22.8	11.5		0.41	7.2	7.5	7.3
3-6	1.06	0.107	10		4	1.1					25.1	14.8		0.35	7.8	8.3	7.9
6-13	0.64	0.072	9		9	1.0		1.42	1.66	0.34	25.9	24.9	14.6	1.0	0.34	8.0	8.5	8.1
13-23	0.32	0.043	7		8	1.0			1.68			24.4	14.8		0.34	7.9	8.0	7.8
23-31	0.17	0.034			5	1.2						33.1	18.5		0.46	8.0	8.0	7.8
31-43	0.13				6	1.1		1.54	1.82	0.64	27.0	33.9	18.8	2.8	0.46	7.9	8.0	7.8
43-55	0.13				5	1.1						33.1	17.6		0.44	7.9	8.0	7.8

Depth (In.)	Extractable bases 5B1a: Ca	Mg	6P2a Na	6Q2a K	Cat. Exch Cap.: 5A1a NH_4OAc	5A2a $NaOAc$	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6R1a CO_3	6J1a HCO_3	6K1a Cl	6L1a SO_4	8A1a Electrical conductivity
	meq/100 g						meq/liter								mmho/cm
0-3			Tr.	1.3	20.9	21.8			0.3	0.4					0.65
3-6			0.1	1.1	24.2	25.8			0.5	0.2					0.58
6-13			0.5	0.6	22.4	24.8			1.4	0.2					0.52
13-23			3.5	0.5	21.8	22.5	23.0	43.2	89.5	0.5	-	8.4	-	97.7	7.0
23-31			12.2	0.4	21.6	22.3	21.6	162	127	0.6	-	6.8	1.0	312	>15
31-43			13.6	0.5	21.4	22.7	21.3	152	127	0.7	-	4.3	1.5	311	>15
43-55			13.4	0.5	21.6	22.2	21.5	146	126	0.7	-	6.1	1.7	302	>15

Depth (In.)	8A Water at Saturation	5D1 Exchangeable Na / $NaOAc$ CEC	5E Sodium Adsorption Ratio	6F1a Gypsum	8D1 NH_4OAc CEC to Clay Ratio
	Pct.	Pct.		Pct.	
0-3	59.7			-	0.74
3-6	73.8			-	0.58
6-13	73.6	2		-	0.52
13-23	65.0	7	5	4.6	0.51
23-31	72.0	13	13	4.7	0.54
31-43	76.7	17	14	1.4	0.52
43-55	78.5	16	14	1.2	0.54

a. > 50% organic matter.
b. > 50% gypsum. < 5% carbonate.
c. 5-25% gypsum. < 5% carbonate.
d. Coefficient of linear extensibility.

Soil Type: Litle silt loam
Soil Nos.: S61Colo-3-1
Classification: Brown.
Location: 220 feet north, 2,820 feet east of the southwest corner of Sec. 23, T5S, R57W, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation 13 inches. Mean annual temperature 49° F.
Frost-free period 150 days. Elevation 5,000 feet.
Vegetation: Native pasture. Blue grama, western wheatgrass, buffalograss, sixweeks fescue, snakeweed, pricklypear.
Parent material: Partially consolidated silty shale - Pierre formation.
Physiographic position: Upland. Relief: Gently sloping, smooth 5 percent west-facing slope.
Drainage: Very slow internal in D horizon. Moderate internal in solum. Intake rate is moderate.
Moisture: Moist throughout, but usually dry.
Water table: None. Stoniness: None.
Salt or alkali: Gyp horizon typical below 12 inches. Calcareous at 0 to 6 inches, less with depth.
Erosion: Slight water erosion. Catsteps or slips occur on slopes over 8 percent.
Described by: J. B. Brown, June 26, 1961.

Horizon and
Lincoln
Lab. No.

A1
15485 0 to 3 inches. Dark grayish brown (2.5Y 4/2, moist) silt loam; grayish brown (2.5Y 5.5/2, dry) weak medium subangular blocks breaking to moderate very fine granules; soft when dry, very friable when moist; surface 1 inch has fine platy structure; clear smooth boundary.

B1
15486 3 to 6 inches. Dark grayish brown (2.5Y 4/2, moist) silty clay loam; grayish brown (2.5Y 5.5/2, dry) olive brown (2.5Y 4/3, moist and crushed) weak fine prismatic breaking to moderate fine angular blocks; slightly hard when dry, friable when moist; many roots and pore spaces; thin clay skins on some vertical faces, and some root channels; strong effervescence; clear slightly wavy boundary.

B2
15487 6 to 13 inches. Olive brown (2.5Y 4.5/3, moist) light silty clay; light yellowish brown (2.5Y 6/4, dry) moderate medium prisms breaking to moderate medium angular blocks; hard when dry, firm when moist; many roots penetrating peds; thin patchy clay skins on all ped surfaces; strong effervescence; clear slightly wavy boundary.

[redacted]

15488 to weak medium subangular blocks; hard when dry, firm when moist; fewer roots and channels than horizons above, but still in evidence; thin patchy clay films along some channels; gyp concretions are common medium and faint; strong effervescence; gradual boundary.

R1
15489 23 to 31 inches. Light olive brown (2.5Y 5/3, moist) silty clay; light yellowish brown (2.5Y 6/3, dry) very weak coarse prismatic structure; hard when dry, firm when moist; few roots and channels in this horizon; slightly effervescent in spots; gradual boundary.

R2
15490 31 to 43 inches. Light olive brown (2.5Y 5/3, moist) silty clay; light yellowish brown (2.5Y 6/3, dry) moderate very coarse plates or massive structure; very hard when dry, firm when moist; a few fine roots may be found; fine iron stains running horizontally in the shale; arbitrary boundary.

R3
15491 43 to 55 inches. Light olive brown (2.5Y 5/3, moist) silty clay; light yellowish brown (2.5Y 6/3, dry) moderate very coarse platy or massive structure; very hard when dry, firm when moist.

Remarks: This soil has been mapped as both Winifred and Pierre in the past. Less than 5 percent cultivated in this county. Some slick spots approximately 100 feet in diameter, are commonly associated with this soil. pH may be 9.0 or more in the top 3 inches of the slick spots, with no B1 horizon present.

Bureau of Public Roads Samples: A1, 0-3 inches; B2, 6-13 inches; Dr2, 31-43 inches.

Observations of fabric with stereoscopic microscope: The B1 and B2 horizons appear to have no clay films on planar surfaces and probably none around circular pores or channels. No clay films observed in the B3cs.

Micromorphology (Method 4K1): Examined thin sections of the B2. A very few small clay films; no really clear-cut clay films along planar surfaces; a number of pressure faces occur. Cannot conclude clay films are absent, but

SCS-420
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Litle silt loam SOIL Nos. SCSColo-3-2 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 15492-15499 February 1965

Depth (In.)	Horizon	1B1a Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Clay: Carbonate	3A1a Clay: Noncarbonate	Coarse fragments 2A2: > 2	Coarse fragments 2A2: 2 – 19	Coarse fragments 2A2: 19–76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0-3	A1	10.0	54.4	35.6	0.1b	0.5b	0.6	1.6	7.2	27.4	27.0	35.7	2.8	-	35.6	Tr.		
3-6	B1	6.4	51.5	42.1	-	0.2b	0.3	1.0	4.9	22.4	29.1	28.0	1.5	-	42.1	Tr.		
6-13	B2	4.1	51.1	44.8	0.1b	0.3b	0.2	0.7	2.8	17.8	33.3	21.1	1.3	-	44.8	Tr.		
13-20	B3cs	14.5	42.4	43.1	0.2c	1.1c	1.3c	6.3c	5.6c	11.0	31.4	20.4	8.9	-	43.1	Tr.		
20-30	B1	1.3	48.4	49.9	0.1c	0.4c	0.2c	0.4c	0.3c	8.9	39.5	9.4	1.4	-	49.9	Tr.		
30-42	B2	0.7	50.2	49.1	0.1c	0.1c	0.1c	0.2	0.2	7.7	42.5	8.0	0.5	-	49.1	Tr.		
42-54	B3	0.5	50.7	48.8	-	-	0.1c	0.2	0.2	8.4	42.3	8.7	0.3	-	48.8	Tr.		
0-1	a	11.3	53.3	35.4	0.2b	0.5b	0.6	1.9	8.1	30.2	23.1	39.6	3.2	-	35.4	-		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N		6E1c Carbonate as $CaCO_3$		Bulk density: 4A1d 1/3-Bar	Bulk density: 4A1h Air-Dry	4D1 COLE e	Water content: 4B1b 1/3-Bar	Water content: 4B2 15-Bar		8D1 15-Bar Water to Clay Ratio	pH: 8C1b Sat. Paste	pH: 8C1a 1:10	pH: 8C1a (1:1)
	Pct.	Pct.			Pct.		g/cc	g/cc		Pct.	Pct.	Pct.				
0-3	1.57	0.139	11		Tr.							12.7	0.36	7.5	7.9	7.6
3-6	0.98	0.091	11		4							14.1	0.33	8.0	8.8	8.3
6-13	0.76	0.076	10		7			1.45	1.74	0.42	24.4		15.7	0.35	8.1	8.9	8.3
13-20	0.3b	0.036	9		4				1.68				15.6	0.36	8.3	8.3	8.2
20-30	0.21	0.029	7		4								19.8	0.40	8.0	8.0	7.8
30-42	0.17				4			1.45e	1.88	1.01	29.5d		20.4	0.42	7.8	8.0	7.7
42-54	0.16				4								20.4	0.42	7.9	8.1	7.7
0-1	2.17				Tr.								12.1	0.34	7.2	7.8	7.4

Depth (In.)	Extractable bases 5B1a: Ca	Mg	6P2a Na	6Q2a K	Cat. Exch Cap. 5A1a NH_4OAc	5A2a NaOAc	Water extract from saturated paste 8A1: 6M1a Ca	6O1a Mg	6P1a Na	6Q1a K	6N1a CO_3	6J1a HCO_3	6K1a Cl	6L1a SO_4	8A1a Electrical conductivity
	meq/100 g						meq/liter								mmho/cm
0-3			0.6	1.3	22.7	23.3			2.4	0.3					0.70
3-6			2.1	0.8	24.0	25.5			5.2	0.1					0.78
6-13			5.2	0.5	23.8	25.6	4.1	10.5	28.0	0.2	-	8.4	0.2	39.2	4.00
13-20			9.9	0.3	20.1	21.2	22.9	122	114	0.3	-	9.6	1.5	270	>15
20-30			17.6	0.4	24.4	26.4	23.3	108	166	0.4	-	7.3		315	>15
30-42			18.2	0.4	25.7	27.4	23.6	100	166	0.5	-	4.8	2.4	351	>15
42-54			17.0	0.4	25.8	27.0	22.4	110	152	0.4	-	4.8	2.4	301	>15
0-1			0.3	1.5	22.5	23.7	3.1	2.9	1.6	0.6	-	7.6	0.2	Tr.	0.78

Depth (In.)	8A Water at Saturation Pct.	5D1 Exchangeable Na NaOAc CEC Pct.	5E Sodium Adsorption Ratio	6F1a Gypsum Pct.	8D1 NH_4OAc CEC to Clay Ratio
0-3	59.3	2			0.64
3-6	61.8	7			0.57
6-13	60.3	14	11	-	0.53
13-20	62.0	13	22	0.7	0.47
20-30	79.0	17	20	2.7	0.49
30-42	79.2	19	21	0.8	0.52
42-54	78.6	18	19	0.6	0.53
0-1	47.6	1	1		0.64

a. Surface of A1 horizon.
b. > 50% organic matter.
c. > 50% gypsum.
d. Ore Clad.
e. Coefficient of linear extensibility.

Soil Type: Litle silt loam
Soil Nos.: S61Colo-3-2
Classification: Brown.
Location: 2,900 feet east, 90 feet south of the northwest corner of Sec. 31, T5S, R57W, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation 13 inches. Average annual temperature 49° F. Frost-free period 150 days. Elevation 5,000 feet.
Vegetation: Native pasture. Blue grama, western wheatgrass, alkali sacaton, buffalograss, sixweeks fescue, cheat, pricklypear.
Parent material: Partially consolidated silty shale. Pierre formation.
Physiographic position: Upland.
Relief: Gently sloping, smooth 5 percent slope facing west.
Drainage: External, excessive; internal, very slow in D horizon, well-drained in solum. Intake rate is moderate.
Moisture: Moist throughout when sampled, usually dry.
Water table: None. **Stoniness:** None.
Salt or alkali: Gyp horizon typical below 12 inches. Calcareous at 0 to 6 inches, less with depth.
Erosion: Slight water. Catsteps or slips occur on slopes over 8 percent.
Described by: J. B. Brown, June 26, 1961.

Horizon and Lincoln Lab. No.	
A1 15492	0 to 3 inches. Dark grayish brown (2.5Y 4/2, moist) silty loam; grayish brown (2.5Y 5/2, dry) weak medium subangular blocky breaking to moderate fine granules; soft when dry, very friable when moist; top one inch is moderate fine granular, or platy structure, and was sampled separately at this location; clear smooth boundary.
B1 15493	3 to 6 inches. Dark grayish brown (2.5Y 4.5/2, moist) silty clay loam; grayish brown (2.5Y 5/2, dry) olive brown (2.5Y 4/3, moist and crushed) weak fine prisms breaking to moderate fine angular blocks; slightly hard when dry, firm when moist; many roots and channels, with thin patchy clay film on some faces and along some channels; strong effervescence; clear smooth boundary.
B2 15494	6 to 13 inches. Light olive brown (2.5Y 5/3, moist) silty clay; light yellowish brown (2.5Y 6/3, dry) moderate medium prismatic breaking to moderate fine angular blocks; hard when dry, firm when moist; many roots penetrating peds; thin patchy clay films on ped surfaces; strong effervescence; clear smooth boundary.
B3cs 15495	13 to 20 inches. Olive 5Y 5.5/3, moist) silty clay; pale yellow (5Y 7/3, dry) weak medium prisms breaking to weak medium subangular blocks; hard when dry, firm when moist; some roots with patchy clay film [illegible] gradual smooth boundary.
B1 15496	20 to 30 inches. Olive (5Y 5/3, moist) silty clay; pale yellow (5Y 7/3, dry) light olive brown (2.5Y 5/3, moist and crushed) very weak coarse prismatic or massive structure; hard when dry, firm when moist; few roots and channels ; fine horizontal iron stains, giving a change in color when the soil is moist and crushed; in this horizon and below, pockets of clear gyp crystals one inch or more square are present, with an average of two per square foot of surface; slightly effervesent in spots; gradual smooth boundary.
B2	30 to 42 inches. Olive (5Y 5/3, moist) silty clay; light olive gray (5Y 6/2, dry) moderate very coarse

SOIL SURVEY LABORATORY Lincoln, Nebr. June 1961

SOIL TYPE Lucky gravelly sandy loam LOCATION Gunnison County, Colorado

SOIL NOS. S59Colo-26-2 LAB. NOS. 11994-11997

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-6	A11	23.0	19.1	6.6	8.7	6.0	28.6	8.0	26.0	12.8	27	cosl
6-13	A12	30.4	19.8	6.3	7.3	4.7	24.3	7.2	20.0	12.3	32	cosl
13-20	B2t	23.6	16.4	6.0	8.2	6.0	27.5	12.3	24.6	12.9	41	cosl
20-37	B3	21.2	18.1	6.6	9.4	6.9	27.4	10.4	25.7	13.2	39	cosl

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6C1a Free Iron Fe_2O_3%		6E1c $CaCO_3$ equivalent %		MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.9			1.62	0.120	14	1.5		< 0.1				4.6
7.0			0.70	0.058	12	1.6		< 0.1				4.2
7.1			0.35	0.032	11	1.6		< 0.1				6.2
7.4			0.20	0.018		1.8		< 0.1				6.1

5A1a CATION EXCHANGE CAPACITY NH_4OAc	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. NH_4OAc EXCH. 5C1	Base Sat. % on Sum Cations 5C3	Sum Ext. Bases 5B1a	Sum Ext. Cations 5A3a	Ca/Mg 8D3		O. D. Bulk Density g/cc
← milliequivalents per 100g. soil →												
10.3	8.6	1.2	2.4	< 0.1	0.6	101	81	10.4	12.8	7.2		
8.7	7.0	1.6	1.4	< 0.1	0.4	103	86	9.0	10.4	4.4		
11.3	9.1	2.4	2.1	< 0.1	0.4	105	85	11.9	14.0	3.8		
11.9		2.6	1.7	0.1	0.2							

Soil Type: *Lucky gravelly sandy loam
Date: September 1959, by J. Nishimura, D. Boyer, E. Kleven, W. Goddard, E. M. Payne, J. S. Allen, L. Juve, C. J. Fox
Parent Material: Residual and partly colluvial from gneiss and schist.
Physiographic Position: Smooth rounded hilly to low mountainous upland slope at an elevation of 9150 feet.
Topography: Steep, uniform slope of 25 percent with westerly exposure.
Drainage: Well-drained
Location: NE¼ of Sec. 10, T. 48N., R. 1 E. photo 3020, Gunnison County, Colorado.
Vegetation: Dominantly big sagebrush (Artemisia tridentata), bitterbrush (Purshia tridentata), very sparse grasses. About 60 percent vegetative ground cover.
Use: Rangeland
Soil Nos.: S-59-Colo-26-2
Described by: Charles F. Fox.

Lincoln Lab. No.	Horizon		
11994	A_{11}	0-6 inches	Rocks and angular gravel occupy about 5 percent of surface. Dark yellowish brown (10YR 3/4 dry) to (10YR 2/4 moist) gravelly sandy loam; weak very fine granular structure; soft when dry, very friable when moist, nonplastic when wet; approximate pH 6.5; approximately 15 percent of this horizon is angular gravel; roots plentiful; lower boundary clear and smooth.
11995	A_{12}	6-13 inches	Yellowish brown (10YR 5/4 dry) to dark yellowish brown (10YR 4/4 moist) gravelly sandy loam; weak medium subangular blocky structure that crushes to moderate fine granules; slightly hard when dry, very friable when moist; slightly sticky when wet; approximate pH 6.0; roots plentiful; lower boundary clear and smooth.
11996	B_{2t}	13-20 inches	Yellowish brown (10YR 5/4 dry) or dark yellowish brown (10YR 4/4 moist) gravelly clay loam; moderate medium subangular blocky structure that crushes to moderate fine granules; very hard when dry, firm when moist, plastic when wet; thin continuous clay films; approximate pH 6.5; occasional angular gneiss and schist rocks; roots few; lower boundary clear and wavy.
11997	B_3	20-37 inches	Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) gravelly sandy clay loam; weak medium angular blocky structure breaking to strong fine granules; subangular blocky aggregates are somewhat vesicular; thin clay films; an occasional angular rock; roots very few; approximate pH 6.5; lower boundary abrupt and wavy. 37" plus. Gneiss and schist bedrock.

Remarks: Thickness of the A horizon varies widely depending upon proximity to sagebrush. The A horizon is deeper immediately under sagebrush.

Bureau of Public Roads Samples: 0-6 inches, 20-37 inches.

SOIL SURVEY LABORATORY Lincoln, Nebr. 3/18/58

SOIL TYPE Mine gravelly loam **LOCATION** Grand County, Colorado

S55Colo-25-7 **LAB. NOS.** 2899-2902

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19 mm.)	
0-3	A1	8.4	9.4	7.1	13.7	11.6	40.4	9.4	40.2	19.7	6	l
3-6	A3	8.5	9.7	6.8	14.4	13.9	39.1	7.6	44.0	17.6	8	sl
6-13	C1	7.8	10.9	10.1	19.5	15.7	30.6	5.4	43.9	13.8	12	sl
13-20+	C2	9.8	14.4	10.0	17.2	14.2	28.6	5.8	39.9	12.9	16	sl

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6C1a Free Iron Fe_2O_3 %				MOISTURE TENSIONS 4B2 1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
6.1			1.82	.088	21	1.4						6.8
5.8			0.70	.044	16	1.4						5.2
5.9			0.33	.018	18	1.3						4.3

Soil Type: Mine gravelly loam
Soil Nos.: S55Colo-25-7
Location: Approximately the NE 1/4 of the NE 1/4, Sec. 4, T2S, R76W, Grand County, Colorado. About 0.1 mile north and 50 feet west of the Forest Service headquarters building on the road to Fraser.
Physiographic Position: Outwash terrace.
Topography: Gently sloping convex area having a gradient of approximately 3 percent facing northwest.
Drainage: Well drained.
Vegetation: Lodgepole pine, understory of vaccinium brush and grass.
Use: Forest land.
Collected by: James Allen and A. J. Cline, August, 1955.

Horizon and Lincoln Lab. No.	
Ao	1 to 0 inch. Very dark gray (10YR 3/1 dry) to black (10YR 2/0 moist) partially decomposed organic material. A thin surface cover of last year's needle fall overlies this horizon. This horizon rests abruptly on the horizon below.
A1 2899	0 to 3 inches. Dark grayish brown (10YR 4/2 dry) to very dark brown (10YR 2/2 moist) gravelly loam; soft when dry, very friable when moist; moderate medium and fine crumb structure; approximately neutral; the horizon contains many plant roots; lower boundary gradual and wavy.
A3 2900	3 to 6 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) gravelly loam; slightly hard when dry, very friable when moist; very weak medium subangular blocky structure breaking to weak to moderate fine granules; approximately neutral, lower boundary gradual and wavy.
C1 2901	6 to 13 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) gravelly sandy loam; soft when dry, very friable when moist; very weak coarse and medium subangular blocky structure; approximately neutral; lower boundary gradual and wavy.
C2 2902	13 to 20 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) gravelly sandy loam; loose when dry, very friable when moist; massive; approximately neutral in reaction.

SOIL SURVEY LABORATORY Lincoln, Nebr. 3/18/58

SOIL TYPE Mine gravelly loam **LOCATION** Grand County, Colorado

SOIL NOS. S55Colo-25- 8 **LAB. NOS.** 2914-2916

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE	COARSE	MEDIUM	FINE	VERY FINE				3A1	2A2	TEXTURAL CLASS

Soil Type: Mine gravelly loam
Soil Nos.: S55Colo-25-8
Location: In the NW 1/4 of Sec. 3, T2S, R76W, Grand County, Colorado, just east of the Forest Service headquarters building on the first terrace level across St. Louis Creek.
Physiographic Position: Outwash terrace.
Topography: Gently sloping convex area of approximately 3 percent gradient.
Drainage: Well drained.
Vegetation: Principally lodgepole pine with a thin understory cover.
Use: Forest lands.
Collected by: H. Bindschadler, J. Allen, J. Retzer, and A. Cline, August, 1955.

Horizon and Lincoln Lab. No.

Ao - Aoo — 1 to 0 inch. The upper part of this horizon is a nearly undecomposed mat of pine needles. The lower part is partially decomposed. This horizon rests abruptly on the horizon below.

A1 2914 — 0 to 3 inches. Very dark grayish brown (10YR 3/2 dry) to very dark brown (10YR 2/2 moist) gravelly loam; soft when dry, very friable when moist; weak to moderate fine crumb structure; slightly acid in reaction; lower boundary clear and wavy.

C1 2915 — 3 to 9 inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; very weak medium subangular blocky structure breaking to medium to coarse crumb; approximately neutral in reaction; about 30 percent of this horizon is gravel; lower boundary gradual and smooth.

C2 2916 — 9 to 18 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) gravelly sandy loam; loose when dry and moist; massive; approximately neutral in reaction; about 70 percent of this horizon is gravel and rock fragments.

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Nathrop loam **LOCATION** Chaffee County, Colorado

SOIL NOS. S58Colo-8-5 **LAB. NOS.** 9067-9070

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)							3A1		2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-4	A1	4.2a	2.9a	1.9a	3.8a	7.9a	47.6	31.7	27.6	30.5	12	cl
4-9	B2t	3.6a	3.1a	2.1a	4.3a	7.5a	41.8	37.6	23.8	28.4	16	cl
9-13	B3ca	3.8b	3.9b	2.6b	5.5b	8.9b	39.4	35.9	26.0	25.9	26	cl
13-19	Cca	4.6b	4.9b	3.3b	7.3b	11.2b	36.5	32.2	29.5	23.0	30	cl

Soil Type: Nathrop loam. **Described by:** A. J. Cline
Location: NE¼ of Sec. 33, T13S, R77W, Chaffee County, Colorado
Date of Sampling: September 1957
Collectors: A. J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline
Physiographic Position: Upland mountain slope at an elevation of approximately 9,300 feet.
Topography: A moderately steep convex slope of approximately 8 percent facing south.
Drainage: Well drained. Vegetation: Ring muhly, mountain fescue, scattered blue grama. Use: National Forest Service land.
Soil Nos.: S58Colo-8-5

Lincoln Horizon Lab. No.			
9067	A_1	0-4 inches	Grayish brown or brown (8.75YR 5/2 dry) to very dark grayish brown or dark brown (8.75YR 3/2 moist) loam; soft when dry, very friable when moist; weak fine subangular blocky structure, breaking to moderate fine granules; strongly effervescent; lower boundary clear and smooth.
9068	B_{2t}	4-9 inches	Brown (7.5YR 5/3 dry) to dark brown (7.5YR 3.3/3 moist) clay loam; slightly hard when dry, very friable when moist; weak medium prismatic structure breaking to weak to moderate medium subangular blocks; strongly effervescent; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; approximately 10 percent of this horizon is gravel; lower boundary clear and smooth.
9069	B_{3ca}	9-13 inches	Brown (7.5YR 5/3 dry) to dark brown (7.5YR 4/3 moist) gravelly loam; slightly hard when dry, very friable when moist; weak fine subangular blocky structure; breaking to moderate fine granules; violently effervescent; this is a weak horizon of lime accumulation with visible lime occurring as concretions and as coating on the gravel; approximately 40 percent of this horizon is gravel; there are a few thin patchy clay skins principally on the vertical faces of the soil aggregates; lower boundary gradual and smooth.
9070	C_{ca}	13-19 inches	White (10YR 8/2 dry) to light brownish gray or pale brown (10YR 6/2.5 moist) gravelly loam; slightly hard when dry, very friable when moist; massive or very weak granular structure; violently effervescent; this is a prominent horizon of lime accumulation with visible lime occurring mostly in finely divided forms; approximately 50 percent of this horizon is gravel; lower boundary gradual and smooth.
	D	19-26 inches	Fractured and partially weathered Pennsylvanian limestone bedrock. This horizon was not sampled.

SCS-420 a
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Nepesta silty clay loam a/ SOIL Nos. S60Colo-50-9 LOCATION Prowers County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14682-14685 January 1966

Depth (In.)	Horizon	1B1a Size class and particle diameter (mm) Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1 Clay 3A1a Carbonate	Clay 3A1a Non-carbonate	Coarse fragments 2A2 > 2 (<19) Pct.	2 – 19 Pct. of < 76 mm	19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0-7	Ap1	13.1	45.5	41.4	1.0b	1.1c	0.6c	1.6c	8.8c	22.3	23.2	32.2	4.3	Tr.	41	Tr.		
7-11	Ap2	15.6	43.4	41.0	0.7	1.8c	0.8c	2.0c	10.9c	22.6	20.8	34.9	4.7	Tr.	41	Tr.		
11-16	B21	23.5	41.5	35.0	1.2	2.1c	1.3c	3.0c	15.9c	26.1	15.4	44.0	7.6	1	34	Tr.		
16-26	B22	23.3	43.7	33.0	3.2	2.7c	1.2c	2.5c	13.7c	30.1	13.6	45.4	9.6	4	29	Tr.		

Depth (In.)	Horizon	6A1a Organic carbon Pct	6B1a Nitrogen Pct	C/N	6E1c Carbonate as $CaCO_3$ Pct	Bulk density 4A1c 30-cm. g/cc	Bulk density 4A1b Air-Dry g/cc	4B1 COLE d/	Water content 4B3 30-cm. Pct	Water content 4B1b 1/3-Bar Pct	Water content 4B2 2-Bar Pct	Water content 4B2 15-Bar Pct	4C1 1/3-Bar to 15-Bar Atm./in.	pH 8C1b Sat. Paste	pH 8C1a 1:1	pH 8C1a 1:10

[redacted]

Soil Type: Nepesta silty clay loam
Soil Nos.: S60Colo-50-9
Location: 150 feet north and 66 feet west of south quarter corner, Sec. 22, T22S, R43W, Prowers County, Colorado.
Elevation: 3,540 feet. Climate: Continental climate, average annual precipitation 13 to 15 inches, frost-free season 165 days.
Physiographic Position: Upland.
Relief: Nearly level, 0-1 percent slopes.
Drainage: Good.
Moisture: Moist.
Water Table: None.
Stoniness: None.
Salt or Alkali: Possible slight salinity.
Erosion: Siltation.
Present Use: Irrigated cropland - corn.
Parent Material: Loess.
Described by: James P. Pannell, November, 1960.

Horizon and Lincoln Lab. No.	
Ap1 14682	0 to 7 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 3.5/2 moist and crushed) silty clay loam; moderate medium granular structure; dry hard, moist firm; strongly effervescent; clear smooth boundary.
Ap2 14683	7 to 11 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 3.5/2 moist and crushed) silty clay loam; moderate medium angular and subangular blocky structure to moderate medium granular; dry hard, moist firm; strongly effervescent; clear smooth boundary.
B21 14684	11 to 16 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 3.5/2 moist and 4/2.5 moist crushed) silty clay loam; moderate medium prismatic and subangular blocky structure to moderate fine subangular blocky; dry hard, moist friable; slightly effervescent; thin nearly continuous clay skins; clear smooth boundary.
B22 14685	16 to 26 inches. Grayish brown (10YR 5.5/2 dry) to dark grayish brown (10YR 4/2 moist and 4/2.5 moist crushed) silty clay loam; weak to moderate fine subangular blocky structure; dry hard, moist friable; strongly effervescent; thin nearly continuous clay skins; clear smooth boundary.
B3ca	26 to 39 inches. Light grayish brown (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist and crushed) silty clay loam; weak fine subangular blocky structure; dry slightly hard, moist very friable; violently effervescent; thin patchy clay skins and few lime spots; gradual smooth boundary.
Cca	39 to 50 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist and crushed) silt loam; massive; dry soft, moist very friable; violently effervescent; few lime spots; gradual smooth boundary.
C	50 to 60 inches plus. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist and crushed) silt loam; massive; dry soft, moist very friable; violently effervescent.

SCS-420 a
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Nepesta silty clay loam a/ SOIL Nos. S60Colo-50-10 LOCATION Prowers County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14686-14689 January 1966

Depth (In.)	Horizon	1Bla Size class and particle diameter (mm) Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3Al Clay: Carbonate	Clay: Noncarbonate	Coarse fragments: 2A2 >2 (<19)	Coarse fragments: 2 – 19	Coarse fragments: 19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0–5	Ap1	9.0	36.6	54.4	0.2b	0.3a	0.3a	1.5a	6.7a	14.4	22.2	22.2	2.3	2	52	-		
5–8	Ap2	9.5	38.7	51.8	-	0.3a	0.4a	1.4a	7.4a	16.2	22.5	24.5	2.1	2	50	Tr.		
8–13	AB	7.7	37.5	54.8	0.1	0.2a	0.2a	1.1a	6.1a	13.9	23.6	20.8	1.6	2	53	Tr.		
13–21	B21	13.4	47.6	39.0	-	0.3a	0.4a	1.5a	11.2a	26.5	19.1	40.7	2.2	2	37	Tr.		

Soil Type: Keota silty clay loam
Soil Nos.: S60Colo-50-10
Location: 0.45 mile east and 0.15 mile north of southwest corner, Sec. 19, T21S, R47W, Prowers County, Colorado.
Climate: Continental climate, average annual precipitation 13 to 15 inches, frost-free season 165 days.
Elevation: 3,825 feet.
Parent Material: Loess.
Physiographic Position: Upland.
Relief: Nearly level, 0-1 percent slopes.
Drainage: Good.
Moisture: Moist.
Water Table: None.
Stoniness: None.
Salt or Alkali: Possible slight salinity.
Erosion: Siltation.
Present Use: Irrigated cropland.
Described by: James P. Pannell, August, 1960.

Horizon and Lincoln Lab. No.	
Ap1 14686	0 to 5 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 3.5/2 moist and crushed) silty clay loam; moderate fine granular structure; dry hard, moist firm; strongly effervescent; clear smooth boundary.
Ap2 14687	5 to 8 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 3.5/2 moist and crushed) silty clay loam; weak to moderate medium subangular blocky structure to moderate medium granular; dry hard, moist firm; violently effervescent; thin patchy clay skins; clear smooth boundary.
AB	8 to 13 inches. Grayish brown (10YR 5/2 dry) to dark brown (10YR 3/2.5 moist) dark grayish-brown (10YR

[redacted]

B21 14689	13 to 21 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist and 3.5/2 moist crushed) silty clay loam; moderate medium and fine prismatic structure to moderate medium subangular blocky;

SOIL SURVEY LABORATORY Lincoln, Nebr. 3/18/58

SOIL TYPE Hystron peat LOCATION Clear Creek County, Colorado

SOIL NOS. S55Colo-10-1 LAB. NOS. 2903-2908

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.00	> 2 (<19mm.)	
0-3		47.1	13.1	2.6	2.7	1.5	12.9	20.1	1.0	14.8	5	scl
3-14		12.9	8.6	2.9	4.2	2.8	40.5	28.1	23.7	22.0	5	cl
14-17	D1	43.5	18.6	4.6	5.3	3.1	11.8	13.1	10.3	7.4	8	cosl
17-23	D2	51.0	10.2	3.9	6.5	2.0	11.7	14.7	8.8	8.1	25	cosl
23-29	D3	69.7	9.2	1.3	1.5	1.0	8.1	9.2	3.8	6.1	52	lcos
29-34	D4	40.1	14.2	5.2	7.2	5.2	17.9	10.2	15.7	11.5	33	cosl

Soil Type: Nystrom peat
Soil Nos.: S55Colo-10-1
Location: Approximately the NW 1/4 of the NW 1/4 of Sec. 22, T3S, R76W, Clear Creek County, Colorado, approximately 1 mile east of the pass on the Jones Pass road.
Physiographic Position: Alpine areas on mountain crest.
Topography: Nearly level to slightly depressed basin.
Drainage: Poorly drained.
Vegetation: Willow, water-loving sedges, tufted hair grass.
Use: Grazing land.
Collected by: A. Aandahl, J. Retzer, H. Bindschadler, E. M. Payne, August, 1955.

Horizon and Lincoln Lab. No.	
2903	0 to 3 inches. Very dark gray (10YR 3/1 dry) to black (10YR 2/0 moist) fibrous grass and sedge peat. The outline of individual plant remains are clearly visible in this horizon. Extremely acid in reaction. Lower boundary gradual and smooth.
2904	3 to 14 inches. Very dark gray (10YR 3/1.5 dry) to black (10YR 2/1 moist) fibrous grass and sedge peat; the outline of individual plant remains are clearly visible in this horizon; extremely acid; lower boundary clear and wavy.
D1 2905	14 to 17 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) fine gravelly sandy loam; slightly hard when dry, very friable when moist; weak coarse granular structure; extremely acid in reaction; lower boundary clear and wavy.
D2 2906	17 to 23 inches. Very pale brown (10YR 7/4 dry) to yellowish brown (10YR 5/4 moist) gravelly sandy clay loam; hard when dry, friable when moist; very weak medium subangular blocky structure; extremely acid; the horizon contains common numbers of medium-sized distinct 10YR 3.5/4 and 10YR 5/6 mottles and stains; lower boundary clear and wavy.
D3 2907	23 to 29 inches. Very pale brown (10YR 7/3 dry) to yellowish brown (10YR 5/4 moist) gravelly loam; slightly hard when dry, very friable when moist; massive; strongly acid in reaction; lower boundary clear and smooth.
D4 2908	29 to 34 inches. Very pale brown (10YR 7/5 dry) to yellowish brown (10YR 5/5 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; medium acid in reaction.

SOIL SURVEY LABORATORY Lincoln, Nebr. June 1961

SOIL TYPE *Parlin channery loam **LOCATION** Gunnison County, Colorado

SOIL NOS. S59Colo-26-1 **LAB. NOS.** 11987-11993

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	3A1 2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-4	A11	6.1	5.6	3.2	6.3	13.6	50.6	14.6	46.8	20.9	32	sil
4-10	A12	4.4	4.3	2.7	5.6	12.1	49.1	21.8	45.1	19.2	44	l
10-19	B1	4.6	3.7	2.0	4.5	11.4	40.8	33.0	39.3	15.5	58	cl
19-27	B2t	4.3	5.0	3.0	6.0	12.2	38.5	31.0	39.3	14.7	44	cl
27-32	B3	3.8	4.5	3.0	5.8	11.6	41.5	29.8	38.9	17.4	28	cl
32-39	C	5.0	5.0	3.4	7.2	12.7	40.5	26.2	39.8	17.4	33	l
39-53	B2b	3.0	3.7	2.6	5.8	11.8	43.1	30.0	38.8	19.4	25	cl

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6C1a Free Iron Fe_2O_3%		6E1c $CaCO_3$ equivalent %		MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.0			1.98	0.151	13	1.2		< 0.1				7.2
7.0			1.20	0.107	11	1.2		< 0.1				8.9
7.0			0.60	0.060	10	1.4		< 0.1				13.7
7.7			0.23	0.032		1.4		< 0.1				13.4
8.0			0.16			1.4		0.2				12.7
8.2			0.19			1.3		0.3				12.0
8.2			0.08			1.3		0.4				13.3

5A1a CATION EXCHANGE CAPACITY NH_4OAc	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4OAc EXCH. 5C1	Base Sat. % on Sum Cations 5C3	Sum Ext. Bases 5B1a	Sum Ext. Cations 5A3a	Ca/Mg 8D3		O. D. Bulk Density g/cc.
← milliequivalents per 100g. soil →												
14.0	11.7	2.1	3.1	< 0.1	1.2	107	83	15.0	18.1	5.6		
15.8	13.1	2.8	2.9	< 0.1	0.6	104	85	16.5	19.4	4.7		
23.1	18.5	4.2	2.7	0.1	0.6	101	90	23.4	26.1	4.4		
23.1	20.6	4.3	1.7	0.2	0.4	110	94	25.5	27.2	4.8		
20.4		4.0	1.0	0.2	0.4							
19.6		3.7	0.2	0.4	0.5							
21.7		4.3	0.2	0.6	0.6							

Soil Type: *Parlin channery loam
Date: Sept. 1959, by J. Nishimura, D. Boyer, E. Kleven, W. Goddard, J.S.Allen, L. Juve, and C. J. Fox
Area: Gunnison County, Colorado
Location: NW¼ - SE¼ of Sec. 22, T. 49 N., R. 2 E. photo 2991
Parent material: Residual and partly colluvial from felsitic (rhyolite) rocks.
Physiography: Side slope of smoothly rounded mountain at an elevation of approximately 8500 feet.
Topography: Northeast exposure with 26 percent slope.
Drainage: Excessive
Vegetation: Big sagebrush (Artemisia tridentata), serviceberry, occasional cacti, very sparse grasses consisting mainly of needle and thread (Stipa Comata)
Use: Rangeland Described by: Charles J. Fox.
Soil Nos.: S-59-Colo-26-1

Lincoln Lab. No.	Horizon		
11987	A_{11}	0-4 inches	Brown (10YR 4/3 dry) to dark brown (10YR 3/3 moist) weak very fine granular loam; soft when dry, very friable when moist; about 5 percent angular gravel; approximate pH 6.5; roots plentiful; lower boundary clear and smooth.
11988	A_{12}	4-10 inches	Dark grayish brown (10YR 4/2 dry) to very dark grayish brown (10YR 3/2 moist) loam; weak medium angular blocky structure crushing to moderate fine granules; slightly hard when dry, friable when moist, slightly sticky when wet; about 3 percent of angular gravel; approximate pH 6.0; roots plentiful; lower boundary clear and wavy.
11989	B_1	10-19 inches	Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) gravelly clay loam; moderate medium subangular blocky structure crushing to moderate fine granules; hard when dry, firm when moist, and plastic when wet; thin clay films; approximate pH 6.5; roots few; about 15 percent of volume consists of gravel; lower boundary gradual and smooth.
11990	B_{2t}	19-27 inches	Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) clay loam; moderate medium subangular blocky structure crushing to strong fine granules; very hard when dry, very firm when moist, and very plastic when wet; thin continuous clay films; approximate pH 6.0; about 3 percent angular gravel; roots few; lower boundary gradual and smooth.
11991	B_3	27-32 inches	Light brown (7.5YR 6/4 dry) to brown (7.5YR 5/4 moist) clay loam; moderate medium angular blocky structure crushing to moderate fine granules; thin discontinuous clay films; hard when dry, firm when moist; plastic when wet; about 3 percent angular gravel; approximate pH 6.5; matrix of soil noncalcareous but weakly calcareous in spots and seams; roots few; lower boundary clear and smooth.
11992	C	32-39 inches	Light brown (7.5YR 6/4 dry) to brown (7.5YR 5/4 moist) light clay loam; weak medium angular blocky structure that crushes to moderate fine granules; slightly hard when dry, friable when moist, plastic when wet; approximately 3 percent of this horizon is angular gravel; calcareous in spots and seams; approximate pH 8.0; roots few; lower boundary gradual and smooth.
11993	B_{2b}	39-53 inches	Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) clay loam; moderate medium angular blocky structure crushing to moderate medium granules; hard when dry, firm when moist, plastic when wet; thin discontinuous clay films; some tiny black iron or manganese concretions; calcareous in spots and seams; no roots; approximately pH 8.0; lower boundary gradual and smooth.
	B_{3b}	53-59 inches	Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) heavy loam; weak medium angular blocky structure crushing to weak medium granules; slightly hard when dry; friable when moist, slightly sticky when wet; about 3 percent of this horizon is lime coated gravel; calcareous in spots and seams; approximate pH 8.0; a few black concretions; some old roots and root channels.

Bureau of Public Roads Samples: 4-10 inches, 10-19 inches, 32-39 inches.

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1958

SOIL TYPE *Penitente loam **LOCATION** Boulder County, Colorado

SOIL NOS. S57Colo-7-1 **LAB. NOS.** 7568-7573

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	3A1 0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
1½-0	$A_{oo}A_{oo}$											
0-4½	A11	2.1a	3.6a	3.2a	8.3a	6.5a	51.3	25.0	36.4	25.9	1	sil
4½-8	A12	15.6a	14.9a	8.1a	16.0a	9.8a	27.3	8.3	31.5	14.0	26	cosl
8-13	B1r	11.8a	13.6a	7.9a	15.9a	11.0a	35.6	4.2	35.4	20.0	36	cosl
13-18	B3	4.5a	8.9a	6.4a	13.9a	10.5a	50.2	5.6	38.2	30.4	35	sil
18-24+	C	19.2a	14.7a	8.4a	16.1a	9.7a	26.2	5.7	29.1	15.5	42	cosl

pH 8C1a	ORGANIC MATTER 6A1a 6B1a	Free	MOISTURE TENSIONS 4B2

Soil Type: *Penitente loam
Location: Niwot Ridge, approximately 200' west of the Tundra Laboratory, Boulder County, Colorado
Date of Sampling: July 1, 1957
Collectors: W. Osburn, A. J. Cline Described by: A. J. Cline
Physiographic Position: Alpine Ridge
Topography: Gently undulating ridge top having approximately 5 percent gradient.
Drainage: Well drained
Vegetation: Thick Kobresia bellardi sod with some Carex drummondi.
Use: National forest land. (Alpine Experimental Fields)
Soil Nos.: S-57-Colo-7-1 Lincoln Laboratory Nos.: 7568-7573

$1\frac{1}{2}$-0 inches A_o, A_{oo} LSI 7568 — This is an organic horizon made up of undecomposed and partially decomposed plant refuse principally Kobresia roots and plant remains.

0-$4\frac{1}{2}$ inches A_{11} LSI 7569 — Very dark gray (10YR 3/1 dry) to black (10YR 2/1 moist) loam; slightly hard when dry, very friable when moist; weak to moderate coarse crumb structure; noncalcareous; lower boundary clear and smooth. Temperature 50° F.

$4\frac{1}{2}$-8 inches A_{12} LSI 7570 — Very dark grayish brown (10YR 3/2 dry) to very dark brown (10YR 2/2 moist) loam; slightly hard when dry, very friable when moist; weak fine subangular blocky structure breaking to moderate coarse crumbs; noncalcareous, approximate pH 5.6; lower boundary gradual and wavy. Temperature 45° F.

8-13 inches B_{ir} LSI 7571 — Brown (10YR 5/3 dry) to dark brown (10YR 3/3 moist) stony loam; hard when dry, very friable when moist; weak to moderate medium and fine subangular blocky structure; noncalcareous, approximate pH 4.6; there are a few very thin and patchy clay skins visible only on a few surfaces; lower boundary gradual and smooth. Approximately 25% of this horizon is stone; the underside of the stone fragments are thickly coated with a dark brown (10YR 3/3 and 10YR 2/2 coating). Temperature 35° F.

13-18 inches B3 LSI 7572 — Pale brown (10YR 6/3 dry) to brown or dark brown (10YR 4/3 moist) stony loam; hard when dry, very friable when moist; weak to moderate medium and fine subangular blocky structure; noncalcareous, approximate pH 4.4; there are a few very thin and patchy clay skins visible on some of the aggregate faces; the temperature of this horizon on the day sampled was approximately 32°; approximately 40% of the horizon is stone; the underside of the stones is coated with a (10YR 3/3 coating); lower boundary diffuse and wavy.

18-24 + inches C LSI 7573 — Light yellowish brown (2.5Y 6/3 dry) to olive brown (2.5Y 4/3 moist) stony sandy loam; hard when dry, very friable when moist; very weak medium subangular blocky structure or massive; noncalcareous, approximate pH 4.8; about 75% of this horizon is stone; there is some coating of (10YR 3/3) materials on the underside of the rocks but somewhat less than in the horizon above. Temperature 27° F.

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1958

SOIL TYPE *Penitente loam **LOCATION** Boulder County, Colorado

SOIL NOS. S57Colo-7-2 **LAB. NOS.** 7574-7578

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
1-0	A_{oo}											
0-5	A1	6.2a	7.5a	4.7a	7.9a	5.7a	47.2	20.8	30.9	26.0	Tr.	1

Soil Type: *Penitente loam
Location: Niwot Ridge, approximately 500 yards east of the Tundra Laboratory, Boulder County, Colorado
Date of Sampling: July 1, 1957
Collectors: W. Osburn, A. J. Cline Described by: A. J. Cline
Physiographic Position: Alpine Ridge
Topography: Moderately steeply sloping ridge crest of about 8 percent gradient.
Drainage: Moderately well drained.
Vegetation: Thick Kobresia bellardi sod and a few small sedges
Use: National Forest lands (Alpine Experimental Fields)
Soil Nos.: S-57-Colo-7-2 Lincoln Laboratory Nos.: 7574-7578

1-0 inches Organic material consisting of undecomposed and partially decomposed Kobresia roots and plant remains.
A_o, A_{oo} LSL 7574

0-5 inches Very dark gray (10YR 3/1 dry) to black (10YR 2/1 moist) loam; soft when dry, very friable when moist; weak to moderate coarse
A_1

crumb structure; noncalcareous, approximate pH 5.8; lower boundary
LSL 7575 clear and wavy. On the date sampled the temperature of this horizon was 50° F.

5-9 inches Pale brown (10YR 6/3 dry) to brown or dark brown (10YR 4/3 moist)
B_{ir} loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure, breaking to weak to moderate very fine
LSL subangular blocks; noncalcareous, approximate pH 4.6; on the date
7576 of sampling the temperature of this horizon was 42° F; lower boundary clear and smooth.

9-14 inches Pale yellow (2.5Y 7/3 dry) to olive brown (2.5Y 4.5/4 moist) loam;
BC slightly hard when dry, very friable when moist; weak medium subangular blocky structure, breaking to weak to moderate very fine
LSL subangular blocks; noncalcareous, approximate pH 4.4; on the date
7577 of sampling the temperature of this horizon was 30° F; about 15% of this horizon was stone; the underside of the rocks had a dark brown (10YR 3/3 coating); lower boundary gradual and wavy.

14+ inches Pale yellow (2.5Y 7/3 dry) to olive brown or light olive brown
C (2.5Y 4.5/4 moist) stony loam or very fine sandy loam; hard when dry, very friable when moist; massive; noncalcareous, approximate
LSL pH 4.4; on the date of sampling the temperature of this horizon
7578 was 28° F; approximately 50% of this horizon is stone; the underside of the rocks is coated with a dark brown (10YR 3/3 coating).

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Peyton sandy loam SOIL Nos. S63Colo-18-5 LOCATION Douglas County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18662-18669 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Soil Type : *Peyton sandy loam
Soil Nos. : S63Colo-18-5
Location : 400 feet south, 1200 feet east of the northwest corner of Section 21, T10S, R66W, Douglas County, Colorado
Climate : Continental, average annual precipitation 20 inches. Mean annual temperature 44 degrees F. Growing season 120 days. Elevation 7200 feet.
Vegetation : Native pasture; blue grama, needleandthread, western wheatgrass, mountain muhly, Junegrass
Parent Material: Dawson arkose or outwash material from the Dawson
Physiographic Position : Upland
Relief : Sloping, 12 percent west facing slope; slope about 300 feet in length, pit near the center of the slope
Drainage : Surface drainage is rapid; internal drainage is moderate; intake rates are moderate to rapid
Moisture : Moist to 7 inches and below 4 feet; usually moist throughout
Watertable : None
Stoniness : Few fine water worn gravels throughout, mainly feldspar and quartz
Salt or Alkali : None observed
Erosion : Slight water erosion
Sampled by : R. K. Dansdill, J. B. Brown, R. H. Jordan, and L. G. Shields; August 14, 1963
Described by : J. B. Brown

Horizon and Lincoln Lab. No.	
A11 18662	0 to 7 inches. Very dark brown (10YR 2/2, moist) sandy loam; dark grayish brown (10YR 4/2, dry); weak coarse subangular blocky structure; hard when dry, loose when moist; noncalcareous; gradual smooth boundary.
A12 18663	7 to 15 inches. Very dark brown (10YR 2/2 moist) sandy loam; dark grayish brown (10YR 4/2 dry); weak coarse subangular blocky structure; hard when dry, loose when moist; noncalcareous; clear smooth boundary.
A3 18664	15 to 20 inches. Brown (10YR 4/3 moist) sandy loam; pale brown (10YR 5/3 dry); weak coarse subangular blocky structure; hard when dry, loose when moist; noncalcareous; clear smooth boundary.
B21t 18665	20 to 24 inches. Brown (10YR 4/3 moist) and brown (10YR 5/3 dry); heavy coarse sandy loam; moderate medium prisms breaking to moderate medium subangular blocks; very hard when dry, friable when moist; noncalcareous; thin nearly continuous clay films; clear smooth boundary.
B22t 18666	24 to 34 inches. Dark yellowish brown (10YR 4/4 moist) sandy clay loam; yellowish brown (10YR 5/4 dry); moderate coarse prisms breaking to moderate medium and coarse angular blocks; extremely hard when dry, firm when moist; noncalcareous; thin nearly continuous clay films; clear smooth boundary.
B3 18667	34 to 41 inches. Yellowish brown (10YR 5/4 moist) coarse sandy loam; pale brown (10YR 6/3 dry); weak coarse subangular blocky structure; extremely hard when dry, very friable when moist; noncalcareous; thin patchy clay films on vertical faces; few weakly cemented sandy bands 1/2 inch thick; gradual smooth boundary.
C1 18668	41 to 48 inches. Pale brown (10YR 6/3 moist) coarse sand; very pale brown (10YR 7/3 dry); massive structure; hard when dry, loose when moist; noncalcareous; clear smooth boundary.
C2 18669	48 to 68 inches. Light brownish gray (2 1/2Y 6/2 moist) coarse sand; light gray (2 1/2Y 7/2 dry); massive structure; hard when dry, loose when moist; noncalcareous; weakly cemented sandy bands 1/4 to 1 1/2 inches thick and 1 to 2 inches apart are present throughout the C horizon.

Remarks: The light colored layer at 15 to 20 inches may be an A2 rather than an A3 horizon; it is seldom visible when the sandy loam A horizon is less than 12 inches thick. Feldspar sands and gravels are numerous throughout the profile. These soils are extensive in Douglas County at elevations of more than 6700 feet.

Bureau of Public Roads Samples: A12, B22t, and C2 horizons.

Mineralogy:

Observations on fine sand (Method 7B1): A11, B22t, and C1 horizons. 65 to 70 percent feldspar, 20 to 25 percent quartz, and 5 to 10 percent accessory minerals. Potassium feldspar (orthoclase) predominates; a few plagioclase were observed. Accessory minerals identified: mica, amphibole (hornblende), zircon, opaques, chert, and plant opal (A11 horizon).

Clay mineralogy (Method 7A1, 7A2): C2 horizon. The C2 horizon contains a moderate amount of kaolinite and small amounts of montmorillonite and mica (or illite). The mica and kaolinite are well crystallized; the montmorillonite is of fair crystalline quality. The fine clay is poorly crystallized montmorillonite and kaolinite. The clay mineralogy is mixed.

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL *Peyton sandy loam SOIL Nos. S63Colo-18-6 LOCATION Douglas County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18670-18678 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1b <0.002	2A2 Coarse fragments a: 3B1 > 2 (< 19) Pct.	3B2 ≤ 2 (Vol. <19) Pct.
		Pct. of < 2 mm														
0-4	A11	70.0	19.3	10.7	1.7	8.6	12.3	26.8	20.6	12.9	6.4	48.8	49.4		2	1
4-11	A12	71.9	16.9	11.2	1.8	8.8	12.9	27.3	21.1	10.5	6.4	47.7	50.8		3	2
11-14	A3	66.8	17.8	15.4	2.3	8.3	11.0	24.9	20.3	11.3	6.5	46.0	46.5		3	2
14-18	B21t	63.0	18.1	18.9	1.9	6.9	10.0	23.2	21.0	12.7	5.4	47.3	42.0		1	
18-30	B22t	47.5	27.2	25.3	1.0	4.9	5.8	14.4	21.4	15.6	11.6	45.7	26.1		tr	
30-41	B23t	52.6	26.1	21.3	1.2	6.2	6.9	15.8	22.5	16.2	9.9	48.5	30.1		tr	
41-53	B24t	44.9	32.7	22.4	2.0	6.0	4.4	10.4	22.1	19.3	13.4	48.0	22.8		tr	
53-64	IIB2	69.4	15.2	15.4	16.4	14.4	8.8	16.2	13.6	9.2	6.0	32.2	55.8	8.7	20	12
64-72	IIIC	52.3	25.8	21.9	4.2	8.7	7.0	15.6	16.8	13.1	12.7	39.2	35.5		6	3

Depth (In.)	6A1a Organic carbon b Pct.	6B1a Nitrogen Pct.	C/N	Ext. Iron as Fe Pct.	6E2a Carbonate as $CaCO_3$ Pct.	Bulk density: 4A1a Field State g/cc	4A1d 1/3-Bar c g/cc	4A1d 1/3-Bar g/cc	4A1b Air Dry g/cc	4D1 COLE	Water content: 4B4 Field State Pct.	4B1c 1/3-Bar Pct.	4B2 15-Bar Pct.	4C1 1/3-to 15-Bar	pH 8C1a (1:1)
0-4	1.93	0.141	14			1.43	1.44	1.45	1.45	-	13.4	13.8	5.4	0.12	5.8
4-11	0.99	0.090	11			1.46	1.39	1.42	1.44	0.003	4.0	13.1	5.0	0.12	6.2
11-14	0.55	0.062	9			1.52	1.43	1.46	1.50	0.010	4.4	14.4	5.6	0.13	6.4
14-18	0.51	0.052	10			1.56		1.50	1.55	0.010	4.8	13.8	7.2	0.10	6.7
18-30	0.37	0.039	9			1.73		1.60	1.74	0.028	8.1	17.5	10.0	0.12	6.5
30-41	0.21					1.60		1.52	1.60	0.017	6.6	16.4	8.5	0.12	6.6
41-53	0.18				-(s)	1.62		1.52	1.62	0.020	7.6	16.3	9.1	0.11	6.8
53-64	0.10				-(s)	1.66	1.38	1.59	1.66	0.014	7.7	14.3	6.3	0.13	7.0
64-72	0.06				-(s)	1.56	1.44	1.48	1.59	0.024	11.8	19.6	9.0	0.16	7.1

Depth (In.)	Extractable bases 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	5B1a Sum	6H1a Ext. Acidity	Cat. Exch. Cap. 5A3a Sum Cations	5A1a NH_4OAc	8D3 Ca/Mg	Base saturation 5C3 Sum Cations	5C1 NH_4OAc
	meq/100 g									Pct.	Pct.
0-4	5.5	1.2	tr	0.5	7.2	4.7	11.9	9.0	4.6	61	80
4-11	6.2	1.6	tr	0.3	8.1	2.9	11.0	8.6	3.9	74	94
11-14	6.8	2.3	tr	0.3	9.4	2.2	11.6	9.5	3.0	81	99
14-18	7.7	4.4	tr	0.3	12.4	2.5	14.9	10.9	1.8	83	114
18-30	10.5	3.8	0.1	0.4	14.8	2.9	17.7	16.2	2.8	84	91
30-41	12.0	4.3	0.1	0.3	16.7	1.9	18.6	13.8	2.8	90	121
41-53	11.2	4.1	0.2	0.4	15.9			15.0	2.7		106
53-64	7.4	2.6	0.1	0.2	10.3			9.8	2.8		105
64-72	11.1	3.4	0.2	0.3	15.0			13.9	3.3		108

Depth (In.)	Ratios to Clay 8D1: NH_4OAc CEC	15-Bar Water
0-4	0.84	0.50
4-11	0.77	0.45
11-14	0.62	0.36
14-18	0.58	0.38
18-30	0.64	0.40
30-41	0.65	0.40
41-53	0.67	0.41
53-64	0.64	0.41
64-72	0.63	0.41

a. No greater-than-19-mm. material to 53 inches, less than 10 percent by volume from 53-72 inches.
b. 10 kg/m² to 60 inches (Method 6A).
c. Calculated to include volume but not weight of 2-19 mm. material (Method 3B2).

Soil Type : *Peyton sandy loam
Soil Nos. : S63Colo-18-6
Location : 1270 feet north, 1620 feet west of the east quarter corner of Section 33, T10S, R65W, Douglas County, Colorado
Climate : Continental, average annual precipitation 20 inches. Mean annual temperature 44 degrees F. Growing season 120 days. Elevation 7200 feet.
Vegetation : Native pasture; blue grama, western wheatgrass, fringed sage and snakeweed
Parent Material : Aeolian, probably local, from the Dawson arkose formation
Physiographic Position : Upland
Relief : Sloping, 10 percent southeast facing slope. Slope about 100 feet in length; pit dug near the base of the slope
Drainage : Surface drainage rapid; internal drainage moderate; moderate to rapid intake rate
Moisture : Moist to 10 inches and below 36 inches. Usually moist throughout
Watertable : None
Stoniness : None
Salt or Alkali : None
Erosion : Slight water erosion
Sampled by : R. K. Dansdill, J. B. Brown, R. H. Jordan, and L. G. Shields; August 14, 1963
Described by : J. B. Brown

Horizon and Lincoln Lab. No.

A11 18670 — 0 to 4 inches. Very dark brown (10YR 2/2 moist) sandy loam; dark grayish brown (10YR 4/2 dry); weak fine granular structure; hard when dry, very friable when moist; noncalcareous; much rodent and ant activity in this horizon; clear smooth boundary.

A12 18671 — 4 to 11 inches. Very dark brown (10YR 2/2 moist) sandy loam; dark grayish brown (10YR 4/2 dry); very weak coarse subangular blocky structure; hard when dry, very friable when moist; rodent and ant activity evident; clear smooth boundary.

A3 18672 — 11 to 14 inches. Dark gray (10YR 4/1 moist and crushed) sandy loam; grayish brown (10YR 5/2 dry); very weak coarse subangular blocky structure; hard when dry, very friable when moist; clear smooth boundary.

B21t 18673 — 14 to 18 inches. Brown (10YR 4/3 moist) heavy sandy loam; brown (10YR 5/3 dry); weak to moderate coarse subangular blocky structure; very hard when dry, firm when moist; thin patchy clay films with some sand grains on ped surfaces; clear smooth boundary.

B22t — 18 to 30 inches. Brown (10YR 4/3 moist and crushed) and light yellowish brown (10YR 6/4 dry) [illegible] extremely hard when dry, very firm when moist; noncalcareous; thin nearly continuous clay films; few sandy loam pockets; gradual smooth boundary.

B23t 18675 — 30 to 41 inches. Brown (10YR 5/3 moist) sandy clay loam; pale brown (10YR 6/3 dry); moderate medium to coarse prisms breaking to moderate medium to coarse angular blocks; very hard when dry, firm when moist; noncalcareous; thin patchy clay films; few bands about 1/4 inch wide of sandy loam material; gradual smooth boundary.

B24t 18676 — 41 to 53 inches. Brown (10YR 5/3 moist) sandy clay loam; pale brown (10YR 6/3 dry); weak coarse prisms breaking to weak to moderate coarse subangular blocks; hard when dry, firm when moist; noncalcareous; a few thin patchy clay films; thin sandy bands; gradual smooth boundary.

SOIL SURVEY LABORATORY Lincoln, Nebr. January 1960

SOIL TYPE Platner fine sandy loam LOCATION Morgan County, Colorado

SOIL NOS. S59Colo-44-9 LAB. NOS. 10887-10897

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm.)	
0-3½	A11	2.8	7.2	6.9	16.5	21.4	30.4	14.8	49.7	11.5	Tr.	fsl
3½-7	A12	3.7	6.8	6.8	15.7	17.9	30.0	19.1	43.6	13.4	3	l
7-8½	A2B	2.4	6.0	7.4	17.6	18.0	26.0	22.6	45.6	8.7	Tr.	scl
8½-14	B21t	3.8	7.7	7.4	17.7	16.4	21.8	25.2	40.1	8.4	4	scl
14-20	B22t	1.4	4.2	5.1	12.1	12.8	29.9	34.5	37.6	12.1	3	cl

Soil Type: Platner fine sandy loam
Soil Nos.: S59Colo-44-9
Field classification: Chestnut.
Location: 75 feet north, 1,350 feet east, west quarter corner, Sec. 3, T6N, R58W, Morgan County, Colorado.
Photo: YE-1F-48.
Climate: Continental, average annual precipitation 13-15 inches. Elevation 4,750 feet. Frost-free season 146 days.
Mean annual temperature 48° F.
Vegetation: Blue grama, buffalograss, cacti.
Physiographic position: Upland.
Parent material: Tertiary outwash.
Relief: Gently sloping 1-2 percent slope.
[redacted]

Salt or alkali: None observed except calcium carbonate. Erosion: Slight.
Described by: Clayton F. Spears, May 7, 1959.
Remarks: Many krotovinas of insects and worms from B21 through the Cca.

Horizon and Lincoln Lab. Nos.	
A11 10887	0 to 3½ inches. Grayish brown (10YR 5/2 dry) to dark brown (10YR 3/2.5 moist and crushed) fine sandy loam; weak to moderate medium crumb structure breaking to weak to moderate fine crumbs; soft when dry, very friable when moist; noncalcareous; lower boundary clear and smooth.
A12 10888	3½ to 7 inches. Grayish brown (10YR 5/2 dry) to dark brown (10YR 3/2.5 moist and crushed) fine sandy loam; weak coarse subangular blocky structure breaking to moderate medium crumbs; soft when dry, very friable when moist; noncalcareous; lower boundary clear and smooth.
A2B 10889	7 to 8½ inches. Gray to light brownish gray (10YR 6/1.5 dry) to dark brown (10YR 3.5/3 moist and crushed) fine sandy loam; weak medium subangular blocky structure; slightly hard when dry, very friable when moist; [redacted]

SOIL SURVEY LABORATORY Lincoln, Nebr. January 1960

SOIL TYPE Platner fine sandy loam LOCATION Morgan County, Colorado

SOIL NOS. S59Colo-44-10 LAB. NOS. 10898-10907

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)							3A1		2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm,)	
0-4½	A11	5.6	13.8	13.7	22.6	19.2	17.5	7.6	40.7	7.0	5	sl
4½-8½	A12	4.5	10.4	11.0	20.5	19.9	21.6	12.1	43.8	8.3	6	fsl

Soil Type: Flatner fine sandy loam
Soil Nos.: S59Colo-44-10
Field classification: Chestnut.
Location: 800 feet south, 80 feet east of northwest corner, Sec. 17, T5N, R55W, Morgan County, Colorado.
Photo: YE-6F-53.
Climate: Continental, average annual precipitation 13-15 inches. Elevation 4,550 feet. Frost-free season 146 days. Mean annual temperature 48° F.
Vegetation: Grama, threeawn, buffalograss, few annual weeds.
Parent material: Tertiary outwash.
Physiographic position: Upland.
Relief: Gently sloping, 1-2 percent slope.
Aspect: Southeast.
Drainage: External drainage slow, internal drainage moderate to slow.
Moisture: Moist to 25 inches at time of sampling.
Water table: None observed.
Stoniness: Few small outwash gravels All through Cca.
Salt or alkali: None observed other than calcium carbonate.
Erosion: Slight wind and water.
Described by: Clayton F. Spears, May 7, 1959.
Remarks: Many medium and small krotovinas of insects and worms from B21 through the Cca.

Horizon and Lincoln Lab. No.	
A11	0 to 4½ inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2.5 moist and crushed)
	lower boundary clear and smooth.
A12 10899	4½ to 8½ inches. Grayish brown (10YR 5/2 dry) to dark brown (10YR 3/3 moist and crushed) sandy loam; very weak coarse subangular blocky structure breaking to weak medium crumbs; soft when dry, very friable when moist; noncalcareous; lower boundary clear and smooth.
A2B 10900	8½ to 11 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2.5 moist, 10YR 4/2 crushed) sandy loam; weak medium subangular blocky structure; slightly hard when dry, friable when moist; very thin patchy clay skins on vertical faces of soil aggregates; the aggregates in this horizon have gray coatings on their surface of gray (10YR 6/1 dry) bleached sand and silt particles which are most evident when dry; noncalcareous; lower boundary abrupt and smooth.
B21t 10901	11 to 14 inches. Dark grayish brown (10YR 4/2.5 dry) to very dark grayish brown (10YR 3/2 moist and crushed) clay loam; strong fine prismatic structure breaking to strong fine subangular blocks; hard when dry, firm when moist; moderate continuous clay skins on both vertical and horizontal faces of soil aggregates; some graying on tops of prisms; noncalcareous; lower boundary clear and smooth.
B22t 10902	14 to 19 inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3/3 moist, 10YR 3.5/3 crushed) clay loam; strong fine prismatic structure breaking to strong fine subangular blocks; very hard when dry, firm when moist; moderate continuous clay skins on both vertical and horizontal faces of soil aggregates; noncalcareous; lower boundary clear and wavy; this horizon shows some streaks of brown (10YR 5/3 dry).
B3 10903	19 to 21 inches. Brown (10YR 5/3 dry) to dark brown (10YR 4/2.5 moist) (10YR 4/2 crushed) light clay loam; moderate medium prismatic structure breaking to moderate medium subangular blocks; hard when dry, friable when moist: thin nearly continuous clay skins on both vertical and horizontal faces of soil
	aggregates; very slightly calcareous; lower boundary clear and wavy; this horizon shows streaks of dark grayish brown (10YR 4/2 dry) and some patches of lime.
B3ca 10904	21 to 25 inches. Pale brown (10YR 6.5/3 dry) to brown (10YR 5/3 moist, 10YR 4.5/3 crushed) very fine sandy loam; weak coarse prismatic structure breaking to weak coarse subangular blocks; slightly hard when dry, friable when moist; very strongly calcareous; visible lime in forms of streaks and medium soft concretions; lower boundary clear and smooth; this horizon shows some streaks of very pale brown (10YR 8/3 dry).
Cca	25 to 34 inches. Very pale brown (10YR 8/3 dry) to pale brown (10YR 6/3 moist, 10YR 5.5/3 crushed)

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1958

gravelly sandy loam

SOIL NOS. [illegible] LAB. NOS. 7579-7584

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	3A1 2A2 > 2 (<19mm)	TEXTURAL CLASS
1½-0	A_oA_{oo}										6	
0-4½	A11	35.9a	16.7a	5.7a	8.8a	4.7a	20.0	8.2	17.3	11.6	40	cosl
4½-10	A12	31.2a	17.6a	5.8a	9.3a	6.2a	21.7	8.2	20.4	12.3	36	cosl
10-14	B1r1	17.6a	13.6a	6.7a	16.7a	13.2a	27.9	4.3	36.5	14.0	26	cosl
14-21	B1r2	15.7a	11.3a	5.1a	12.4a	11.7a	38.5	5.3	36.2	21.3	16	cosl
21-29+	C1r	29.0a	19.3a	10.5a	19.6a	5.4a	11.7	4.0	19.8	6.0	69	lcos

pH 8C1a	ORGANIC MATTER 6A1a ORGANIC	6B1a NITRO-	Free Iron Fe2O3	CaCO3	MOISTURE TENSIONS 1/10	1/3	4B2 15

Soil Type: Ptarmigan gravelly sandy loam
Location: Niwot Ridge, approximately 300 yards south by west (approximately 260° bearing) from the first permanent rock monument east of the Tundra Laboratory, Boulder County, Colorado
Date of Sampling: July 2, 1957
Collectors: W. Osburn, A. J. Cline Described by: A. J. Cline
Physiographic Position: Alpine ridge
Topography: Convex ridge side approximately 8 percent gradient.
Drainage: Well drained
Vegetation: Thick Kobresia bellardi sod, some Carex illinoides, and Geum rossi.
Use: National Forest land, (Alpine Experimental Fields)
Soil Nos.: S-57-Colo-7-3 Lincoln Laboratory Nos.: 7579-7584

$1\frac{1}{2}$-0 inches Organic horizon consisting of undecomposed and partially decomposed
A_o, A_{oo} Kobresia roots and plant remains.
LSI 7579

0-$4\frac{1}{2}$ inches Very dark gray (10YR 3/1 dry) to black (10YR 2/1 moist) gravelly
A_{11} sandy loam; soft when dry, very friable when moist; moderate coarse crumb structure; noncalcareous, approximate pH 6.0; lower boundary
LSL clear and wavy; the temperature of this horizon on the day of
7580 sampling was approximately 42° F.

$4\frac{1}{2}$-10 inches Very dark grayish brown (10YR 3/2 dry) to very dark brown (10YR
A_{12} 2/2 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; moderate fine subangular blocky structure, breaking to
LSL weak to moderate medium granules; noncalcareous, approximate pH
7581 6.0; lower boundary gradual and smooth. The temperature of this horizon on the date of sampling was approximately 38° F.

10-14 inches Light yellowish brown (10YR 6/4 dry) to dark yellowish brown (10YR
B_{ir1} 4/4 moist) gravelly loam; slightly hard when dry, very friable when moist; weak to moderate fine subangular blocky structure; noncal-
LSL careous, approximate pH 4.6; there are a few indistinct thin patchy
7582 clay skins on some of the soil aggregates; the temperature on the date of sampling was approximately 32° F. Approximately 30% of this horizon is gravel; lower boundary diffuse and smooth. The gravel and rock fragments are coated on their underside with a very dark brown (10YR 2/2 coating.)

14-21 inches Light yellowish brown or very pale brown (10YR 6.5/4 dry) to dark
B_{ir2} yellowish brown or yellowish brown (10YR 4.5/4 moist) stony loam; slightly hard when dry, very friable when moist; weak to moderate
LSI medium subangular blocky structure, breaking to weak to moderate
7583 fine subangular blocks; noncalcareous, approximate pH 4.4; there are a few indistinct thin patchy clay skins on some of the soil aggregates; approximately 60% of this horizon is stone; the underside of the stone fragments is coated with a dark brown (10YR 3/3 coating) the temperature of the horizon on the date of sampling was approximately 30° F; lower boundary diffuse and smooth.

21-28+ inches Pale brown (10YR 6/3 dry) to brown (10YR 4/3 moist). This horizon
C is principally weakly weathered Monzonite bedrock which may be crushed in some places between the fingers and other places are
LSI relatively indurated. The temperature of this horizon on the date
7584 of sampling is approximately 28° F.

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1958

SOIL TYPE Ptarmigan loam **LOCATION** Boulder County, Colorado

SOIL NOS. S57Colo-7-4 **LAB. NOS.** 7585-7590

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002		

Soil Type: Ptarmigan loam
Location: Niwot Ridge, approximately 600 yards northwest (bearing 340°) from the Alpine Van. Locally the area is known as the northeast shoulder of the Van Knoll, Boulder County, Colorado.
Date of sampling: July 3, 1957
Collectors: W. Osburn, A. J. Cline Described by: A. J. Cline
Physiographic Position: Alpine Ridge
Topography: Convex shoulder of an Alpine Ridge having approximately 8 percent gradient.
Drainage: Well drained
Vegetation: Principally Kobresia bellardi
Use: National Forest land (Alpine Experimental Fields)
Soil Nos.: S-57-Colo-7-4 Lincoln Laboratory Nos.: 7585-7590

2-0 inches A_o, A_{oo} LSL 7585 — Organic horizon of undecomposed and partially decomposed Kobresia roots and plant remains.

0-4 inches A_1 LSL 7586 — Very dark gray (10YR 3/1 dry) to black (10YR 2/1 moist) moderate coarse crumb structure; noncalcareous; on the date of sampling the temperature of this horizon was approximately 40° F; lower boundary gradual and wavy.

4-10 inches AB LSL 7587 — Brown (10YR 5/3 dry) to dark brown (10YR 3.5/3 moist) loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure, breaking to moderate medium granules; noncalcareous, approximate pH 4.6; there are a few indistinct thin patchy clay skins on a few of the soil aggregates; in the date of sampling the temperature of this horizon was approximately 36° F; lower boundary gradual and smooth.

10-15 inches Bir_1 LSL 7588 — Light yellowish brown (10YR 6/4 dry) to dark yellowish brown (10YR 4/4 moist) loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure, breaking to moderate very fine subangular blocks; noncalcareous, approximate pH 4.6; there are a few indistinct patchy clay skins on a few of the aggregate faces; on the date of sampling the temperature of this horizon was approximately 30° F; lower boundary gradual and smooth. There are a few rock and gravel fragments in this horizon and their undersides are coated with a dark brown (10YR 3/3 coating).

15-26 inches Bir_2 LSL 7589 — Light yellowish brown (10YR 6/4 dry) to dark yellowish brown (10YR 4/4 moist) stony sandy loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure; noncalcareous, approximate pH 4.4; on the date of sampling the temperature of this horizon was approximately 28° F; approximately 30% of the horizon is rock; the underside of the rock fragments is coated with dark brown (10YR 3/3 material); lower boundary gradual and smooth.

26-32 + inches C LSL 7590 — Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) stony loamy sand or sand; slightly hard when dry, very friable when moist; massive; noncalcareous; this horizon is mainly decomposed Monzonite; the temperature on the date of sampling was approximately 28° F.

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1958

SOIL TYPE Ptarmigan loam **LOCATION** Boulder County, Colorado

SOIL NOS. S57Colo-7-5 **LAB. NOS.** 7591-7596

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	3A1 2A2 > 2 <1 mm.	TEXTURAL CLASS
2-0	A_0A_{00}										-	
0-5	A1	11.4a	11.2a	5.3a	9.5a	6.0a	33.3	17.8	27.5	21.8	11	1

Soil Type: Ptarmigan loam
Location: About ½ mile northeast (bearing 45°) from the Van Camp, Niwot Ridge, Boulder County, Colorado
Date of Sampling: July 3, 1957
Collectors: W. Osburn, A. J. Cline **Described by:** A. J. Cline
Physiographic Position: Alpine Ridge
Topography: South facing shoulder of Alpine Ridge having a gradient of approximately 5 percent.
Drainage: Well drained
Vegetation: Principally Kobresia bellardi
Use: National Forest Lands. (Alpine Experimental Field)
Soil Nos.: S-57-Colo-7-5 **Lincoln Laboratory Nos.:** 7591-7596

2-0 inches
A_0, A_{oo}
LSL 7591
Organic horizon made up of undecomposed and partly decomposed Kobresia roots and plant remains; the temperature of this horizon on the date of sampling was approximately 62° F.

0-5 inches
A_1
LSL
7592
Very dark gray (10YR 3/1 dry) to black (10YR 2/1 moist) loam; soft when dry, very friable when moist; moderate coarse crumb structure; noncalcareous, approximate pH 5.8; the temperature of this horizon on the date of sampling was approximately 58° F; lower boundary clear and wavy.

5-8 inches
AB
LSL
7593
Dark grayish brown (10YR 4/2 dry) to very dark grayish brown (10YR 3/2 moist) sandy clay loam; slightly hard when dry, very friable when moist; weak to moderate medium subangular blocky structure, breaking to moderate very fine subangular blocks; noncalcareous, approximate pH 4.8; there are a few indistinct clay skins on the surfaces of a few of the soil aggregates; the temperature of this horizon on the date of sampling was approximately 50° F; lower boundary clear and wavy.

8-14 inches
Bir_1
LSL
7594
Light yellowish brown (10YR 6/4 dry) to dark yellowish brown (10YR 4/4 moist) gravelly sandy clay loam; slightly hard when dry, very friable when moist; the upper one-inch of this horizon has a moderate to strong fine platy structure, whereas the rest of this horizon is weak medium subangular blocky breaking to moderate very fine subangular blocks; noncalcareous, approximate pH 4.4; there are a few indistinct clay skins on the surfaces of some of the soil aggregates; on the date of sampling the temperature of this horizon was approximately 42° F; lower boundary gradual and smooth. Approximately 20% of this horizon is gravel.

14-21 inches
Bir_2
LSL
7595
Light yellowish brown (10YR 6/4 dry) to dark yellowish brown (10YR 4/4 moist) gravelly sandy clay loam; approximately 40% of this horizon is gravel and stone; the underside of the stone and gravel fragments are coated with a very dark brown (10YR 2/2 coating); on the date of sampling the temperature of this horizon was approximately 38° F; lower boundary gradual and wavy.

21 + inches
C
LSL
7596
Pale brown (10YR 6.5/3 dry) to brown (10YR 5/3 moist) stony sandy loam; slightly hard when dry, very friable when moist; massive; noncalcareous, approximate pH 5.8; approximately 70% of this horizon is stone; the underside of the stone fragments is coated with very dark brown (10YR 2/2 materials); on the date of sampling the temperature of this horizon was approximately 34° F.

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1958

SOIL TYPE Ptarmigan loam **LOCATION** Boulder County, Colorado

SOIL NOS. 857Colo-7-6 **LAB. NOS.** 7597-7601

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-4½	A1	2.6a	10.5a	8.5a	12.9a	6.4a	44.5	14.6	31.7	25.3	2	l
4½-7	AB	12.8a	15.7a	7.6a	10.6a	6.7a	34.0	12.6	25.2	20.9	14	cosl
7-18	B1r	14.4a	17.0a	7.7a	11.3a	7.7a	37.5	4.4	30.0	21.0	27	cosl
18-24	BC	16.7a	20.9a	9.2a	12.1a	7.7a	30.4	3.0	28.3	15.8	40	cosl
24-30+	C	23.4a	25.9a	10.8a	11.6a	6.7a	18.9	2.7	21.9	9.2	45	lcos

	pH 8C1a		ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron Fe_2O_3 % 6C1a		$CaCO_3$ equivalent %		MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
1:1	1:5	1:10										
	5.7		18.33	1.166	16	1.4						38.1
5.4			3.04	0.233	13	2.3						8.8
5.5			1.85	0.145	13	2.0						5.2
5.7			0.59	0.044	13	1.4						3.3
5.3			0.28			1.6						2.5

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6Q2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	Sum Bases 5B1a	Sum Cations 5A3a	Ca/Mg 8D3
←	milliequivalents per 100g. soil →						← me/100g →			
46.9	30.7	6.2	34.8	<0.1	1.2	81	52	38.1	72.9	5.0
21.6	10.3	2.5	16.9	<0.1	0.2	60	43	13.0	29.9	4.1
15.0	4.2	0.9	16.8	<0.1	0.1	35	24	5.2	22.0	
8.9	1.5	0.2	10.6	<0.1	<0.1	19	14	1.7	12.3	
6.7	0.6	0.3	8.6	<0.1	0.2	16	11	1.1	9.7	

a. Few flakes of mica. Also, few black minerals.

Soil Type: Ptarmigan loam
Location: Niwot Ridge, approximately 3/4 mile north of the Alpine Van Camp, Boulder County, Colorado
Date of Sampling: August 12, 1957
Collectors: W. Osburn, A. J. Cline Described by: A. J. Cline
Physiographic Position: Alpine Ridge
Topography: Moderately sloping ridge side facing northwest and having a gradient of about 8 to 9 percent.
Drainage: Well drained
Vegetation: Chiefly Kobresia bellardi
Use: National Forest lands. (Alpine Experimental Fields)
Soil Nos.: S-57-Colo-7-6 Lincoln Laboratory Nos.: 7597-7601

1-0 inch
A_0, A_{00}
This is an organic horizon made up of undecomposed and partially decomposed Kobresia roots and plant remains. On the date of sampling the temperature of this horizon was approximately 72° F. Not sampled.

0-4½ inches
A_1
LSL
7597
Very dark gray (10YR 3/1 dry) to black (10YR 2/1 moist) loam; soft when dry, very friable when moist; strong, coarse crumbs structure; noncalcareous; on the date of sampling the temperature of this horizon was approximately 60° F; lower boundary clear and smooth.

4½-7 inches
AB
LSL
7598
Dark grayish brown (10YR 4/2 dry) to very dark grayish brown (10YR 3/2 moist) stony loam; soft when dry, very friable when moist; strong coarse crumb structure; noncalcareous, approximate pH 5.0; approximately 40% of this horizon is stone fragments; the lower sides of the stones are coated with a dark brown (10YR 3/2 and 2/2 substance); on the date of sampling the temperature of this horizon was approximately 54° ; lower boundary clear and wavy.

7-18 inches
Bir
LSL
7599
Yellowish brown (10YR 5/4 dry) to dark yellowish brown (10YR 3/4 moist) stony loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure, breaking to moderate medium granules; noncalcareous, approximate pH 4.8; there are a few thin patchy clay skins on the faces of some of the soil aggregates; approximately 50% of this horizon is stone fragments; the underside of the stone is coated with dark brown (10YR 3/3 material); on the date of sampling the temperature of this horizon was 52°F at 11" and 50° F at 15"; lower boundary gradual and irregular.

18-24 inches
BC
LSL
7600
Pale brown (10YR 6/3 dry) to brown or dark brown (10YR 4/3 moist) stony sandy loam; slightly hard when dry, very friable when moist; weak, fine subangular blocky structure, breaking to weak fine granules; noncalcareous, approximate pH 5.4; approximately 60% of this horizon is stone; the underside of the rock fragments is coated with dark brown (10YR 3/3 materials); on the date of sampling the temperature of this horizon at 23" was approximately 50°F; lower boundary gradual and wavy.

24-30 + inches
C
LSL
7601
Pale brown (10YR 6/3 dry) to brown or dark brown (10YR 4/3 moist) stony loamy sand; slightly hard when dry, very friable when moist; massive to single grained; noncalcareous, approximate pH 5.8; approximately 80% of this horizon is stone; the temperature of this horizon on the date of sampling was 42° F at 30".

SOIL SURVEY LABORATORY Lincoln, Nebr. (Revised 11/21/58)

SOIL TYPE Ptarmigan gravelly sandy loam LOCATION Grand County, Colorado

SOIL NOS. LAB. NOS. 2800-2805

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	> 2	TEXTURAL CLASS
0-5	A11	8.9	14.3	7.7	13.5	7.6	33.6	14.4	30.2	18.0		sl/l
5-21	A12	16.5	12.1	7.3	15.3	12.2	25.5	11.1	34.5	12.6		cosl
21-40	B2	10.1	9.3	6.9	18.7	17.2	34.7	3.1	44.4	19.1		fsl
40-55	C1	11.1	15.4	9.6	20.7	13.8	20.1	9.3	34.0	12.0		cosl
55-72	Cf	6.8	9.4	7.0	18.3	16.2	26.5	15.8	38.5	15.4		fsl
72-82	Cgf	14.8	13.2	8.6	21.4	14.6	20.4	7.0	36.3	11.5		cosl

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6C1a Free Iron % Fe_2O_3	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
5.1			1.10	0.798	14	1.1					
4.6			2.17	0.165	13	1.6					
4.8			0.38	0.032	12	1.1					
4.8			0.10	0.007		1.2					
4.8			0.08			1.7					
a			0.11			1.2					

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	5B1a	5C1 Base Sat. % NH_4Ac Exch.	Base Sat. % on Sum Cations 5C3	Sum Cat. Bases me/100g 5B1a	Sum Cat. Cations me/100g 5A3a	Ca/Mg 8D3	MOISTURE AT SATURATION %
←	milliequivalents per 100g. soil →											
33.6	19.4	4.1	28.3	<0.1	0.7		72	46	24.2	52.5	4.7	
20.2	2.2	0.4	20.6	0.1	0.1		14	12	2.8	23.4		
10.3	0.2	0.3	10.3	0.1	0.1		7	6	0.7	11.0		
13.9	4.1	1.2	8.2	0.2	0.3		42	41	5.8	14.0	3.4	
15.3	8.0	2.6	5.6	0.2	0.4		73	67	11.2	16.8	3.1	
a	a	a	a	a	a							

a. Insufficient sample

Soil Type: Ptarmigan gravelly sandy loam
Location: SW 1/4 of Sec. 26, T2S, R76W, Grand County, Colorado. Alpine turf, East St. Louis Alpine Area.
Physiographic Position: Upland.
Topography: Convex Alpine ridge crest.
Drainage: Well drained above the permafrost layers.
Vegetation: Sedges, mainly Kabresia.
Use: National Forest Service lands.
Collected and Described by: John L. Retzer, September 6, 1952.

Horizon and Lincoln Lab. No.	
A11 2800	0 to 5 inches. Black (10YR 2/1 dry to 10YR 2/0 moist) gravelly sandy loam; soft when dry, very friable when moist; moderate to strong fine granular structure; stongly acid, approximate pH 5.2; lower boundary clear and smooth.
A12 2801	5 to 21 inches. Very dark gray (10YR 3/1 dry) to very dark brown (10YR 2/2 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; moderate to strong granular structure; very strongly acid, approximate pH 4.6; lower boundary clear and wavy.
B2 2802	21 to 40 inches. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; moderate to strong fine and very fine subangular blocky structure; very strongly acid, approximate pH 5.0; lower boundary clear and wavy.
C1 2803	40 to 55 inches. Light yellowish brown (2.5Y 6/3 dry) to olive brown (2.5Y 4/4 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; very weak coarse subangular blocky structure or massive; very strongly acid, approximate pH 4.6; horizon contains many medium-sized distinct 5Y 5/6 and 10YR 5/4 mottles; lower boundary gradual and smooth. This horizon is believed to be the top of the frost zone. Rocks are well weathered and soft.
Cf 2804	55 to 72 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/4 moist) gravelly sandy loam; extremely hard when frozen and in place but slightly hard when dry and very friable when moist if unfrozen; massive; very strongly acid, approximate pH 4.5; this horizon contains many large distinct 5Y 5/6 and 10YR 5/8 mottles. Lower boundary diffuse and smooth. It is thought that this horizon is frozen most of the year and may be a perpetual zone of permafrost in some areas.
Cgf 2805	72 to 82 inches. Pale olive (5Y 6/3 dry) to olive (5Y 4/3 moist) gravelly sandy loam; extremely hard when frozen but slightly hard when dry and very friable when moist if unfrozen; massive; very strongly acid, approximate pH 4.5. It is thought that this represents a permanently frozen horizon.

SOIL SURVEY LABORATORY Lincoln, Nebr. 3/17/58

SOIL TYPE Ptarmigan loam **LOCATION** Grand County, Colorado

SOIL NOS. S55Colo-25-1 **LAB. NOS.** 2868-2872

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	3A1 0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-1½	A11	13.3	6.4	2.9	5.4	6.0	47.8	18.2	29.8	27.2	7	l
1½-6	A12	15.4	9.2	4.0	6.6	7.1	38.7	19.0	27.9	21.8	19	l
6-10	B1	36.2	11.9	3.6	5.1	6.3	25.0	11.9	20.3	14.1	29	cosl
10-23	B2	26.1	11.5	4.3	8.1	9.9	27.4	12.7	25.9	16.5	18	cosl
23-35+	C	76.9	8.2	0.7	0.8	1.0	7.4	5.0	3.9	5.0	71	lcos

pH 8C1a 1:1	pH 8C1a 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron Fe_2O_3 & 6C1a	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
	6.0		16.53	1.187	14				39.7
	5.8		12.96	.978	13	1.6			29.4
5.6			3.41	.300	11	2.0			10.7
5.4			0.58	.048	12	3.1			7.7
5.5			0.25	.016	16	1.3			3.9

Soil Type: Ptarmigan loam
Soil Nos.: S55Colo-25-1
Location: Near the southwest corner of Sec. 2, T3S; R77W; Grand County, Colorado.
Physiographic Position: Upland, Alpine crest of mountain.
Topography: A moderately sloping to undulating plain. Sample was taken on a convex sloping area of approximately 8 percent, facing south. Elevation approximately 12,435 feet.
Drainage: Well drained.
Vegetation: Thick ground cover of Alpine grasses and sedges.
Use: Grazing land.
Collected and Described by: James Allen, A. Aandahl, J. Retzer, E. M. Payne, A. J. Cline, August 10, 1955.

Horizon and Lincoln Lab. No.	
A11 2868	0 to 1½ inches. Very dark gray (10YR 3/1 moist or dry) to black (10YR 2/1 moist) loam; soft when dry, very friable when moist; moderate to strong fine and medium crumb structure; strongly acid; the horizon is thickly matted with grass and sedge roots; lower boundary clear and smooth.
A12 2869	1½ to 6 inches. Very dark gray (10YR 3/1 dry) to black or very dark brown (10YR 2/1.5 moist) loam; soft when dry very friable when moist; moderate to strong, medium and coarse crumb and granular structure; strongly acid; the horizon is thickly matted with grass roots; lower boundary clear and wavy.
B1 2870	6 to 10 inches. Yellowish brown (10YR 5.5/4 dry) to dark yellowish brown (10YR 4.5/4 moist) heavy gravelly loam; soft when dry, very friable when moist; moderate to strong fine and very fine subangular blocky structure breaking to fine and medium granules; strongly acid; the horizon has a very few very thin patchy tonhautchen on both horizontal and vertical faces; lower boundary clear and wavy.
B2 2871	10 to 23 inches. Light yellowish brown and yellowish brown (10YR 6/4 and 10YR 5/4 dry) to yellowish brown (10YR 5/4 moist) gravelly sandy clay loam; slightly hard when dry, friable when moist; moderate to strong very fine subangular blocky structure; very strongly acid; the horizon has a few thin patchy tonhautchen on both horizontal and vertical faces of peds; lower boundary gradual and smooth.
C 2872	23 to 35 inches plus. Fractured and weakly weathered gneiss and schist rocks.

SOIL SURVEY LABORATORY MANDAN, NORTH DAKOTA 4-7-55

SOIL TYPE Rago **LOCATION** KIT CARSON CO., COLO.

silt loam

SOIL NOS. S-54-Colo-32-3 **LAB. NOS.** 2570-2578

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-3½	Ap	0.2	0.5	0.2	0.6	21.4	55.6	21.5	55.8	21.6	-	sil
3½-8	A3	0.1	0.5	0.3	0.6	20.5	54.6	23.4	58.9	16.6	-	sil
8-12½	B21	-	0.2	0.1	0.3	12.4	47.7	39.3	45.6	14.7	—	sicl
12½-19	B21b	-	0.2	0.1	0.3	11.5	47.7	40.2	39.8	19.6	-	sic
19-22	B22b	-	0.1	-	0.4	14.3	49.0	36.2	43.1	20.5	-	sicl
22-25	B3cab	-	0.1	0.2	0.8	19.9	49.7	29.3	50.2	19.9	-	cl
25-27	B3cab	0.1	0.3	0.2	1.1	22.0	52.1	24.2	54.2	20.6	-	sil
27-35	B3cab	-	-	0.1	0.6	23.1	54.3	21.9	56.1	21.7	-	sil
35-46	C	-	0.1	0.1	0.5	24.5	57.9	16.9	60.7	22.0	-	sil

	pH		ORGANIC MATTER			8A2	ELECTRICAL CONDUCTIVITY	6K1a		MOISTURE TENSIONS		
8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	EC×10³ MILLIMHOS PER CM @25°C.	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.8	7.4	7.6	1.59	.140	11	-		-				9.5
6.4	7.2	7.3	1.02	.105	10	-		-				10.0
6.4	7.5	7.6	0.86	.103	8	-		-				17.6
7.5	8.6	8.8	0.93	.099	9	-		-				17.5
7.8	9.1	9.2	0.64	.066	10	-		4				16.2
7.9	9.2	9.3	0.46	.050	9	-		4				14.2
8.1	9.4	9.5	0.38	.042	9	-		6				12.7
8.2	9.4	9.5	0.27	.031	9	-		11				12.4

Soil Type: Rago silt loam
Soil Nos.: S54Colo-32-3
Location: 200 feet west, 75 feet north of southeast corner Sec. 34, T10S, R44W, Kit Carson County, Colorado.
Physiographic Position. Upland.
Topography: Nearly level to very gently concave slope of approximately 1 percent.
Drainage: Moderately well drained.
Vegetation: Wheat stubble and a thin growth of weeds.
Use: Cultivated field used for wheat during current season.
Sampled by: James Allen, Dale Romine, E. M. Payne, and A. J. Cline, September 2, 1954.
Described by: E. M. Payne.

Horizon and
Lincoln
Lab. No.

Ap
2570 — 0 to 3½ inches. Pale brown (10YR 6/3 dry) to dark grayish brown (10YR 4/2 moist) silt loam; soft when dry, very friable when moist; weak very fine granular structure; noncalcareous; lower boundary clear and smooth.

A3
2571 — Brown (10YR 5/3 dry) to dark brown (10YR 3.3 moist); silt loam; slightly hard when dry, friable when moist; very weak coarse subangular blocky structure; noncalcareous; moderate numbers of medium sized-distinct 10YR 5/6 mottles; the structure in this horizon may be influenced by tillage; where observed in the cut of the pit, this horizon had an indefinite and irregular zone near its base that had characteristics of an E (or A2) horizon. The color graded in these areas to 10YR 7/3 to 6/3 dry but when moist was about the same color as is described above. It had a vesicular appearance and was slightly lighter in texture. In other places no definite zone of lighter color or vesicular nature could be seen but aggregates frequently were flecked with spots of 10YR 8/2. Lower boundary is abrupt and wavy.

B21
2572 — 8 to 12½ inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) heavy silty clay loam; hard when dry, firm when moist; moderate to strong fine prismatic, breaking to moderate to strong fine angular blocky; noncalcareous; the horizon had a few thin patchy Tonhautchen; lower boundary is clear and smooth.

B21b
2573 — 12½ to 19 inches. Gray (10YR 5/1 dry) to very dark gray (10YR 3/1.5 moist) light silty clay; very hard when dry, firm when moist; moderate medium prismatic, breaking to strong medium angular blocky; noncalcareous; the horizon has thick prominent Tonhautchen; the structural cracks between the peds in this horizon are filled with lighter colored materials washed from the horizon above; lower boundary abrupt and smooth.

B22b
2574 — 19 to 22 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) silty clay loam; hard when dry, friable when moist; weak coarse prismatic, breaking to moderate coarse angular blocky; calcareous; the horizon has a few small calcium carbonate concretions and mycelia; Tonhautchen are moderately prominent; common numbers of medium-sized faint 10YR 4/4 mottles; lower boundary gradual and smooth.

B3cab
2575 — 22 to 25 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/2.5 moist) heavy silt loam; hard when dry, friable when moist; weak coarse prismatic, breaking to moderate coarse angular blocky; calcareous; the horizon contains moderate amounts of accumulated lime both as lime flour and in concretions; this horizon has been thoroughly reworked by worms and dark channels containing material of the horizons above occur prominently in it. There are some channel fillings between the peds of dark material apparently washed down from the preceding horizons. Lower boundary is gradual and smooth.

B3cab
2576 — 25 to 27 inches. Light gray (10YR 7/2 dry) to light brownish gray(10YR 6/2.5 moist) silt loam; slightly hard when dry, very friable when moist; weak coarse prismatic, breaking to weak coarse subangular blocky; calcareous; this horizon contains some accumulated lime but less than the horizon above or the horizon below; this horizon has been thoroughly reworked by worms, and worm casts and channels filled with darker materials from the horizons above are plentiful; some of the aggregate faces are coated with darker material apparently washed from the horizons above. Lower boundary is gradual and smooth.

B3cab
2577 — 27 to 35 inches. Light gray (10YR 7/2 dry) to pale brown (10YR 6/3 moist) silt loam; hard when dry, friable when moist; a very weak coarse subangular blocky structure; calcareous; the horizon contains moderate amounts of accumulated lime chiefly as lime flour but with some calcium carbonate concretions. The amount of lime is greater than in the horizon above or in the horizon below; there are a few worm casts and worm channel fillings in the horizon; lower boundary gradual and smooth.

C
2578 — 35 to 46 inches. Very pale brown (10YR 8/3 dry) to pale brown (10YR 6/3 moist) coarse silt loam or very fine sandy loam; slightly hard when dry, very friable when moist; massive; calcareous; the horizon contains moderate amounts of accumulated calcium carbonate as lime flour and as concretions and mycelia, but there is less than in the horizon above.

SOIL SURVEY LABORATORY MANDAN, NORTH DAKOTA 9-7-55

SOIL TYPE Rago silt loam **LOCATION** KIT CARSON CO., COLO

SOIL NOS. S-54-Colo-32-4 **LAB. NOS.** 2579-2587

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-3	Ap	0.1a	0.4	0.5	1.1	23.7	56.1	18.1	60.7	19.8	-	sil
3-6	B1	0.1a	0.4	0.4	1.0	21.3	53.1	23.7	57.2	17.8	-	sil

Soil Type: Rago silt loam
Soil Nos.: S54Colo-32-4
Location: 50 feet north, 3/10 mile west of southeast corner Sec. 8, T10S, R44W, Kit Carson County, Colorado.

[redacted]

Physiographic Position: Broad flat in the uplands.
Topography: Nearly level to very gently undulating slopes of ½ to 1 percent.
Drainage: Moderately well drained.
Vegetation: Wheat stubble and seasonal weeds.
Use: Cultivated to wheat during the current season.
Sampled by: James Allen and A. J. Cline, September 3, 1954.
Described by: A. J. Cline.

Horizon and Lincoln Lab. No.

Ap 2579 — 0 to 3 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) silt loam; soft when dry, very friable moist; weak very fine granular structure; noncalcareous; lower boundary clear and smooth.

[redacted]

angular blocky; noncalcareous; the peds in this horizon have some white and gray flecking on their surfaces, particularly in the lower inch of this horizon; lower boundary clear and smooth.

B21 2581 — 6 to 11 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) heavy silty clay loam; hard (dry), friable (moist); strong fine prismatic structure breaking to strong medium angular blocky; noncalcareous; the horizon has a few thin patchy Tonhautchen; lower boundary clear and smooth.

B22b 2582 — 11 to 16½ inches. Gray (10YR 5/1 dry) to very dark gray (10YR 3/1 moist) heavy silty clay loam; hard (dry), friable (moist); moderate medium prismatic breaking to strong fine angular blocky; noncalcareous; the horizon contains moderately thick, relatively prominent Tonhautchen; lower boundary is abrupt and smooth.

B2cab 2583 — 16½ to 19½ inches. Variegated light brownish gray (10YR 6/2 dry) and pale brown (10YR 6/3 dry) to very dark grayish brown (10YR 3/2 moist and grayish-brown 10YR 5/2.5 moist) light silty clay loam; hard (dry), friable (moist); moderate medium prismatic, breaking to strong fine angular blocky; calcareous; the horizon contains moderate amounts of small calcium carbonate concretions; Tonhautchen are moderately thick and relatively prominent; variation in color is due to the intense worm working in which materials from the horizons above have been thoroughly worked into this horizon. In addition it appears that some of the material from the above horizon have been washed down into structural cracks and now coat the surfaces of the aggregates there. Lower boundary gradual and smooth.

B3cab 2584 — 19½ to 26 inches. Light brownish gray (10YR 6/2.5 dry) to grayish brown (10YR 5/2.5 moist) light silty clay loam; hard (dry), friable (moist); weak coarse prismatic structure, breaking to moderate medium angular blocky; calcareous; the horizon contains moderate amounts of accumulated lime chiefly as lime flour and as concretions; Tonhautchen are moderately prominent; this horizon is also thoroughly reworked by worms and contains casts and channels filled with darker materials from the horizons above

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Richfield loam SOIL Nos. 863Colo-58-8 LOCATION Sedgwick County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18512-18517, 18581-18582 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05) [b]	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Noncarbonate Clay <0.002		Coarse fragments 2A2: > 2 (< 19)	3B2 > 2 (Vol. < 19)	
		Pct. of < 2 mm														Pct.	Pct.	
0-6	Ap	41.6	36.8	21.6	2.4	5.8	5.7	9.0	18.7	25.8	11.0	49.3	22.9	22		2		
6-14	B2t	30.0	38.4	31.6	1.6	4.3	3.7	5.4	15.0	25.2	13.2	43.1	15.0	32		3		
14-21	B3	25.4	51.0	23.6	0.3	1.5	1.5	2.6	19.5	32.2	18.8	53.2	5.9	24		1		
21-33	C1ca	40.1	44.7	15.2	2.7	5.0	4.1	6.2	22.1	27.4	17.3	52.8	18.0	14		5		
33-52	IIC2ca	70.6	18.8	10.6	3.9	10.8	10.7	18.2	27.0	12.7	6.1	49.6	43.6	10		11	6	
52-78	IIIC3ca	80.4	10.2	9.4	12.3	15.4	12.0	22.6	18.1	6.0	4.2	36.2	62.3	9		27		
6-8	a	33.6	37.6	28.8	1.4	4.8	4.5	7.0	15.9	24.1	13.5	43.8	17.7					
8-13	a	29.1	40.4	30.5	1.6	3.6	3.3	5.4	15.2	25.7	14.7	43.9	13.9					

Depth (In.)	6A1a Organic carbon [c]	6B1a Nitrogen	C/N	Carbonate as $CaCO_3$: 6E1b 6E2a <2 mm.	Carbonate as $CaCO_3$: 3A1a <0.002 mm.	Ext. Iron as Fe	Bulk density: 4A1a Field State	Bulk density: 4A1d 1/3-Bar	Bulk density: 4A1b Air Dry	4D1 COLE	Water content: 4B4 Field State	Water content: 4B1c 1/3-Bar	Water content: 4B2 15-Bar	4C1 1/3- to 15-Bar		pH: 8C1b Sat. Paste	8C1a (1:1)
	Pct.	Pct.		Pct.	Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct.	Pct.	In./in.			
0-6	0.74	0.080	9	-(s)			1.35	1.33	1.39	0.014	18.4	22.4	9.6	0.17			6.7
6-14	0.65	0.072	9	-(s)			1.36	1.28	1.49	0.052	19.8	25.5	14.8	0.14			7.2
14-21	0.54	0.072	8	tr(s)			1.38d	1.23d	1.40d	0.044	10.7d	34.0d	12.0	0.27			7.8
21-33	0.33	0.042	8	8	1		1.50	1.48	1.50	0.003	6.6	17.4	9.8	0.11			8.4
33-52	0.12			4	1		1.44	1.43e	1.44	0.003	7.5	17.6	5.5	0.16		7.9	8.5
52-78	0.03			3	-								4.7				9.1
6-8	0.66												13.1				
8-13	0.74												12.8				

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap.: 5A3a Sum Cations	5A1a NH_4OAc	8A Water at Saturation Pct.	8A1a Elec. Cond. mmho/cm	8D3 Ca/Mg	Base saturation: 5C3 Sum Cations Pct.	5C1 NH_4OAc Pct.
	meq/100 g												
0-6	10.7	3.5	0.1	2.0	16.3	2.9	19.2	16.0			3.1	85	102
6-14	10.6	3.7	tr	2.0	16.3	3.2	19.5	16.0			2.9	84	102
14-21	16.8 f		0.1	2.2				24.0					
21-33	12.0 f	5.2g	0.1	2.1	19.4			16.0			2.3		
33-52	6.6 f	3.6g	0.4	1.8	12.4			10.5	26.5	0.72	1.8		
52-78	5.0 f	2.6g	1.0	1.4	10.0			7.7			1.9		
6-8													
8-13													

Depth (In.)	Ratios to Clay: 8D2 NH_4OAc CEC	8D1 15-Bar Water
0-6	0.73	0.44
6-14	0.50	0.47
14-21	1.00	0.51
21-33	1.14	0.64
33-52	1.05	0.52
52-78	0.86	0.50
6-8		0.45
8-13		0.42

a. Upper and lower portions of the B2t horizon were sampled separately for partial analysis; laboratory numbers are 18581 and 18582, respectively.
b. Few grains of carbonate below 21 inches.
c. 6.6 kg/m² to 52 inches (Method 6A).
d. One clod.
e. 1.34 g/cc. calculated to include volume but not weight of > 2 mm. material (Method 4A).
f. NH_4Cl-EtOH extraction (Method 6N3a).
g. NH_4Cl-EtOH extraction (Method 6O3a).

USDA-SCS-HYATTSVILLE, MD. 1964

Soil Type: Richfield loam
Soil Nos.: S63Colo-58-8
Location: 250 feet east, 140 feet north of south quarter corner, Sec. 19, T10N, R44W, Sedgwick County, Colorado.
Climate: Continental climate, average annual precipitation 17.5 inches, frost-free season of 147 days, mean annual temperature of 49.6 degrees F.
Elevation: 3,800 feet
Vegetation: Seeded to western wheat, blue grama
Parent Material: Loess
Physiographic Position: Upland
Relief: Convex 4 percent east facing slope
Drainage: Well drained
Moisture: Nearly dry
Stoniness: Few small gravels throughout
Salt or Alkali: None
Erosion: Slight, primarily water
Sampled by: R. C. Accola, J. I. Brubacher, R. B. Grossman, R. Moreland, E. M. Payne, and J. L. Walker: July 10, 1963
Described by: J. I. Brubacher

Horizon and Lincoln Lab. No.

Ap 18512 — 0 to 6 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loam; weak fine granular structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.

B2t 18513 — 6 to 14 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) clay loam; strong medium prismatic breaking to s trong medium subangular blocky structure; slightly hard dry, very friable when moist; noncalcareous; thick continuous clay skins; clear smooth boundary.

B3 18514 — 14 to 21 inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) and dark grayish brown (10YR 4/2 crushed) loam; moderate medium prismatic breaking to moderate medium subangular blocky structure; soft dry, very friable when moist; noncalcareous; thin patchy clay skins; clear smooth boundary.

C1ca 18515 — 21 to 33 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) loam; weak medium prismatic breaking to weak medium subangular blocky structure; soft dry, very friable when moist; very highly calcareous; free lime visible along cleavage lines; clear smooth boundary.

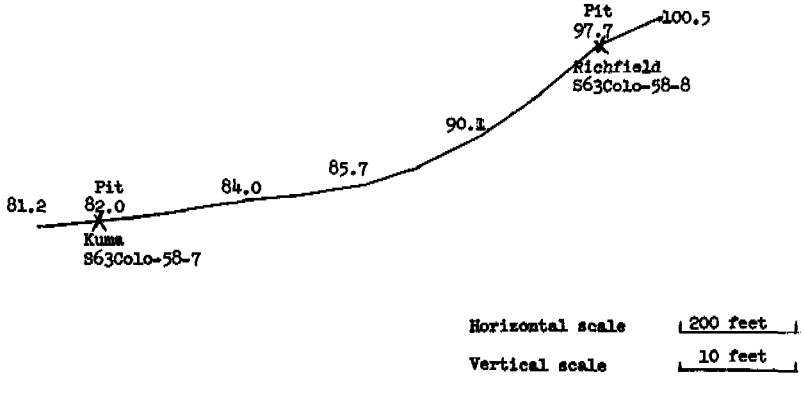
IIC2ca 18516 — 33 to 52 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) fine sandy loam; weak medium structure breaking to weak medium subangular blocky structure; slightly hard dry, very friable when moist; very highly calcareous; visible stone line; pockets of loam and sand; clear wavy boundary.

IIIC3ca 18517 — 52 to 78 inches. Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) coarse sandy loam; massive; slightly hard dry, very friable when moist; very highly calcareous; clear wavy boundary.

IIIC4 — 78 to 138 inches. Pink (7.5YR 7/3 dry) to brown (7.5YR 5/3 moist) sand and gravel; single grain; loose when dry and moist; slightly calcareous; clear wavy boundary.

IIIC5 — 138 to 172 inches. Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) sandy loam; massive; slightly hard dry, very friable when moist; slightly calcareous.

Landscape Profile:



Bureau of Public Roads Samples: Ap, B2t, and C1ca horizons.

Mineralogy (Method 7B1): B2t horizon. Count on very fine sand: 40 percent quartz; 30 percent feldspar; 15 percent compound grains; 10 percent glass shards; accessories include green hornblende, epidote, mica group, primary carbonate, zircon, in approximate order of abundance. Orthoclase is the most common feldspar, with substantial albite, appreciable oligoclase-andesine, and some microcline. The compound grains appear to be mostly altered feldspar but with some altered volcanic glass.

C1ca horizon. Count on very fine sand: 30 percent quartz; 25 percent feldspar; 20 percent compound grains; 25 percent glass shards; accessories include the same as for B2t. Other remarks for B2t pertain.

SCS-421
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Richfield loam SOIL Nos. S63Colo-58-9 LOCATION Sedgwick County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 18518-18523 March 1967

General Methods: 1A, 1B1b, 2A1, 2B

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05) a	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1b <0.0002	3A1a Noncarbonate Clay <0.002	Coarse fragments 2A2: > 2 (< 19)	3B2 > 2 (Wt. <19)
		Pct. of < 2 mm														Pct.	Pct.
0-6	Ap	43.8	39.1	17.1	2.9	6.9	6.7	9.7	17.6	27.1	12.0	49.7	26.2	10.8	17	8	4
6-14	B2t	28.7	37.1	34.2	1.4	4.2	4.0	5.8	13.3	24.7	12.4	41.0	15.4	25.3	34	3	
14-19	B3	29.6	47.4	23.0	0.8	3.0	3.1	4.7	18.0	30.3	17.1	50.8	11.6		23	2	
19-29	C1ca	31.1	55.3	13.6	1.1	2.4	2.6	4.1	20.9	32.2	23.1	55.4	10.2		14	3	
29-39	C2ca	59.2	16.1	24.7	8.8	10.2	10.4	18.2	11.6	5.3	10.8	26.4	47.6	8.6	16	21	
39-70	C3ca	77.3	8.6	14.1	7.8	14.1	15.8	25.0	14.6	5.5	3.1	33.1	62.7		14	18	

Depth (In.)	6A1a Organic carbon b	6B1a Nitrogen	C/N	Carbonate as $CaCO_3$ 6E1b <2 mm.	Carbonate as $CaCO_3$ 3A1a <0.002 mm.	6C2a Ext. Iron as Fe	Bulk density 4A1a Field State	Bulk density 4A1d 1/3-Bar	Bulk density 4A1b Air Dry	4D1	Water content 4B4 Field State	Water content 4B1c 1/3-Bar	Water content 4B2 15-Bar	Water content 4C1 1/3-to 15-Bar	pH 8C1b Sat. Paste	pH 8C1a (1:1)
	Pct.	Pct.		Pct.	Pct.	Pct.	g/cc	g/cc	g/cc	COLE	Pct.	Pct.	Pct.	in/in.		
0-6	0.86	0.090	10			0.4	1.32	1.30c	1.35	0.013	13.9	17.7	7.8	0.12		6.2
6-14	0.65	0.074	9	-(s)		0.7	1.47	1.35	1.61	0.059	19.7	25.9	15.3	0.14		7.0
14-19	0.53	0.069	8	tr(s)	-	0.4	1.30	1.24	1.34	0.028	12.6	24.1	11.1	0.16		7.9
19-29	0.36	0.049	7	5	tr	0.3	1.28	1.25	1.30	0.014	13.6	23.3	11.0	0.15		8.3
29-39	0.16			25	9	0.2							9.7			8.7
39-70	0.02			3	tr	0.3							6.7		8.0	9.1

Depth (In.)	Extractable bases 6N2a Ca	6O2a Mg	6P2a Na	5B1a 6Q2a K	5B1a Sum	6H1a Ext. Acidity	Cat. Exch. Cap. 5A3a Sum Cations	Cat. Exch. Cap. 5A1a NH_4OAc	8A Water at Saturation Pct.	8A1a Elec. Cond. mmhos/cm	8D3 Ca/Mg	Base saturation 5C3 Sum Cations Pct.	Base saturation 5C1 NH_4OAc Pct.
	meq/100 g												
0-6	7.8	2.7	tr	1.7	12.2	4.2	16.4	12.9			2.9	74	95
6-14	17.3	6.3	0.1	2.4	26.1	2.6	28.7	25.0			2.7	91	104
14-19	15.3 d	5.7e	0.1	2.2	23.3			22.7			2.7		
19-29	12.4 d	5.6e	0.2	2.6	20.8			18.9			2.2		
29-39	6.3 d	4.6e	1.2	1.8	13.9			11.3			1.4		
39-70	5.2 d	3.9e	1.8	1.7	12.6			10.1	23.2	1.14	1.3		

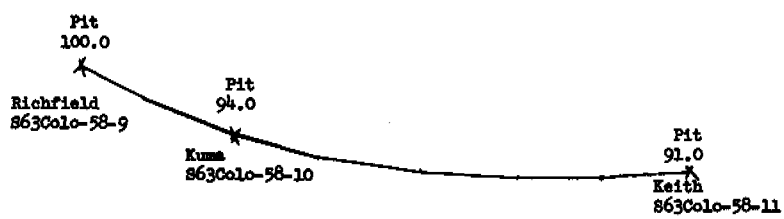
Depth (In.)	Ratios to Clay 8F2 NH_4OAc CEC	8D2 Ext. Iron	8D1 15-Bar Water
0-6	0.76	0.02	0.46
6-14	0.74	0.02	0.45
14-19	0.99	0.02	0.48
19-29	1.35	0.02	0.81

a. Few grains of carbonate below 19 inches.
b. 5.5 kg/m² to 29 inches (Method 6A).
c. 1.25 g/cc when calculated to include volume but not weight of > 2 mm. material (Method 4A).
d. NH_4Cl-EtOH extraction (Method 6N3a).
e. NH_4Cl-EtOH extraction (Method 6O3a).

Soil Type: Richfield loam
Soil Nos.: S63Colo-58-9
Location: 1,584 feet west, 528 feet north of southeast corner, Sec. 11, T10N, R45W, Sedgwick County, Colorado
Climate: Continental climate, average annual precipitation of 17.5 inches, frost-free season of 147 days, mean annual temperature of 49.6 degrees F.
Elevation: 3,800 feet
Vegetation: Cultivated
Parent Material: Loess
Physiographic Position: Upland
Relief: Convex 3 percent southeast facing slope
Drainage: Well drained
Moisture: Moist to 12 inches, nearly dry below
Stoniness: Few small gravels throughout
Salt or Alkali: None
Erosion: Slight, primarily water
Sampled by: R. C. Accola, J. I. Brubacher, R. B. Grossman, R. Moreland, E. M. Payne, and J. L. Walker: July 10, 1963
Described by: J. I. Brubacher

Horizon and Lincoln Lab. No.	
Ap 18518	0 to 6 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loam; weak fine granular structure; soft dry, very friable when moist; noncalcareous; clear smooth boundary.
B2t 18519	6 to 14 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) clay loam; strong medium prismatic breaking to strong fine subangular blocky structure; slightly hard dry, very friable when moist; noncalcareous; thin continuous clay skins; clear smooth boundary.
B3 18520	14 to 19 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) loam; moderate medium prismatic breaking to moderate medium subangular blocky structure; soft dry, very friable when moist; noncalcareous; thin patchy clay skins; clear smooth boundary.
C1ca 18521	19 to 29 inches. Very pale brown (10YR 8/3 dry) to pale brown (10YR 6/3 moist) and very pale brown (10YR 7/3 crushed) loam; weak medium prismatic breaking to weak medium subangular blocky structure; soft dry, very friable when moist; very highly calcareous; clear smooth boundary.
C2ca 18522	29 to 39 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) sandy loam; weak medium prismatic breaking to weak medium subangular blocky structure; soft dry, very friable when moist; horizon is 10 percent gravel; highly calcareous; clear smooth boundary.
C3ca 18523	39 to 70 inches. Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) gravelly sandy loam; thin discontinuous stone line at top of horizon; massive; slightly hard dry, friable when moist; 40 percent gravel; strongly calcareous; very highly calcareous on lime coated gravel; clear wavy boundary.
C4	70 to 132 inches. Pink (7.5YR 8.4 dry) to light brown (7.5YR 6/4 moist) sand and gravel; single grain structure; loose when dry and moist; noncalcareous; 50-60 percent fine gravel.

Landscape Profile:



Horizontal scale 200 feet
Vertical scale 10 feet

Bureau of Public Roads Samples: Ap, B2t, and C1ca horizons.

Mineralogy (Methods 7A1, 7A2): Ap1, B2t, and C2ca horizons. Small to moderate amounts of well-crystallized mica (or illite) and kaolinite are present in the solum. Montmorillonite, poorly organized throughout the profile, increases from a trace in the surface to a moderate amount in the B2t. The C2ca has a moderate amount of montmorillonite and traces of mica (or illite) and kaolinite. The clays are more poorly ordered. Some calcite is present. The fine clay contains only montmorillonite and it is poorly crystallized.

SOIL SURVEY LABORATORY Lincoln, Nebr. May 1959

SOIL TYPE Richfield silt loam **LOCATION** Prowers County, Colorado

SOIL NOS. S58Colo-50-6 **LAB. NOS.** 9688-9696

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)							3A1		2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-4	Ap	0.2	0.6	0.5	1.9	17.3	52.7	26.8	57.0	14.4	-	sil/sicl
4-7	AB	<0.1	0.3	0.4	1.4	14.4	53.4	30.1	53.5	15.4	-	sicl
7-12	B21t	<0.1	0.2	0.3	1.2	11.6	49.6	37.1	47.4	14.7	-	sicl

Soil Type: Richfield silt loam
Classification: Chestnut
Location: 700 ft. W and 90 ft. N of S ¼ corner, Sec. 32, T26S., R42W., Prowers County, Colorado.
Date Sampled: November 6, 1958
Climate: Continental climate, average annual precipitation 15 to 16 inches, elevation 3,700 feet. Frost-free season 166 days.
Vegetation: Sorghum. Parent Material: Loess. Physiographic position: Upland.
Relief: Nearly level to slightly concave position, less than 1% slope.
Drainage: Well. Moisture: Dry. Watertable: None encountered. Stoniness: None.
Salt or Alkali: None observed. Erosion: Moderate Erosion, primarily wind.
Soil Nos.: S-58-Colo-50-6
Described by: E. Milton Payne.

Lincoln Lab. No.	Horizon		
9688	Ap	0-4 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) silt loam; weak fine granular structure; loose when dry, very friable moist; non-calcareous; abrupt smooth boundary caused by tillage.
9689	AB	4-7 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) light silty clay loam; moderate coarse platy, very hard when dry, friable moist; thin nearly continuous clay skins on horizontal faces of peds; non-calcareous; clear smooth boundary.
9690	B_{21t}	7-12 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2.5 moist) silty clay loam; moderate medium prismatic structure breaking to strong fine angular and subangular blocky structure; very hard when dry, firm when moist; moderately, nearly continuous clay skins; non-calcareous; clear smooth boundary.
9691	B_{22t}	12-18 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2.5 moist) silty clay loam; moderate medium prismatic breaking to moderate fine subangular blocky structure; very hard when dry, firm moist; thin nearly continuous clay skins; noncalcareous; clear smooth boundary.
9692	B_{3ca}	18-26 inches	Light brownish gray (10YR 5.5/2 dry) to dark grayish brown (10YR 3.5/2 moist) silty clay loam; moderate medium prismatic breaking to moderate fine subangular blocky structure; hard when dry, firm moist; very thin patchy clay skins; slightly calcareous in matrix with numerous small lime spots; clear smooth boundary.
9693	C_{1ca1}	26-34 inches	Grayish brown (1Y 5/2 dry) to dark grayish brown (1Y 4/2 moist) silty clay loam; very weak coarse prismatic structure breaking to weak coarse subangular blocky; hard when dry, firm moist; strongly calcareous with prominant lime nodules about 1/4 inch in diameter; clear smooth boundary.
9694	C_{1ca2}	34-42 inches	Pale brown (1Y 6/3 dry) to grayish brown (1Y 5/2.5 moist) light silty clay loam, very weak coarse prismatic breaking to moderate fine subangular blocky structure; hard when dry, friable moist; many krotovina; violently calcareous with numerous large lime spots; clear smooth boundary.
9695	C_2	42-49 inches	Light gray (1Y 7/2 dry) to grayish brown (1Y 5/2.5 moist) silt loam; very weak medium prismatic breaking to very weak medium subangular blocky structure; hard when dry, friable moist; considerable mixing of the horizon with krotovina and worm casts, the larger ones being (10YR 3/2 moist) violently calcareous.
9696	C_3	49-70 inches	Light gray (10YR 6.5/2 dry) to grayish brown (10YR 5/2.5 moist) silt loam; massive; slightly hard when dry, very friable moist; violently calcareous.
	C_4	70-90 inches	Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) silt loam; massive; slightly hard when dry, friable moist; violently calcareous.
	D_1	90-110 inches	Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) silt loam; massive; slightly hard when dry, very friable moist; violently calcareous.
	D_2	110-132 inches	Pink to reddish yellow (7.5YR 7/5 dry) to brown (7.5YR 4/5 moist) silt loam; massive; slightly hard when dry, very friable moist; strongly calcareous with large white lime spots.

Bureau of Public Roads Samples

Ap	0 to 4 inches
B_{21}	7 to 12 inches
C_3^1	49 to 70 inches

SOIL SURVEY LABORATORY Lincoln, Nebr. May 1959

SOIL TYPE Richfield silt loam LOCATION Provers County, Colorado

SOIL NOS. S58Colo-50-7 LAB. NOS. 9697-9705

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE	COARSE	MEDIUM	FINE	VERY FINE					3A1 2A2	TEXTURAL CLASS

Soil Type: Richfield silt loam
Classification: Chestnut
Location: 100 ft. S and 50 ft. W of N ¼ corner, Sec. 21, T26S, R42W, Prowers County, Colorado.
Date Sampled: November 6, 1958
Climate: Continental climate, average annual precipitation 15 to 16 inches, elevation 3,700 ft. Frost free season 166 Days.
Vegetation: Wheat-fallow, wheat in 1958. **Parent Material:** Loess.
Physiographic position: Upland. **Relief:** Nearly level to slightly concave position.
Drainage: Well. **Moisture:** Moist. **Watertable:** None encountered. **Stoniness:** None.
Salt or Alkali: None observed. **Erosion:** Slight erosion, principally wind.
Soil Nos.: S-58-Colo-50-7
Described by: E. Milton Payne.

Lincoln Lab No.	Horizon		
9697	Ap	0-3 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) silt loam; weak fine granular becoming platy in lower part, slightly hard when dry, very friable moist; noncalcareous; abrupt smooth boundary caused by tillage implements.
9698	$A_{2}p$	3-6 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) light silty clay loam; weak coarse platy breaking to moderate fine granular; very hard when dry, firm moist; thin very patchy clay skins; noncalcareous; clear smooth boundary.
9699	$B_{21}t$	6-15 inches	Grayish brown (10YR 5/2.5 dry) to dark brown (10YR 3/3 moist) silty clay loam; moderate medium prismatic structure; breaking to strong fine angular and subangular blocky structure, hard when dry, firm moist; moderate nearly continuous clay skins; noncalcareous; clear smooth boundary.
9700	$B_{2}ca$	15-21 inches	Grayish brown (10YR 5.5/2 dry) to dark grayish brown (10YR 4/2.5 moist) silty clay loam; moderate medium prismatic structure breaking to moderate fine subangular blocky; hard when dry, firm moist; thin to moderate nearly continuous clay skins; strongly calcareous; clear smooth boundary.
9701	$B_{3}ca$	21-32 inches	Grayish brown (10YR 5/2.5 dry) to brown (10YR 4.5/3 moist) silty clay loam; weak coarse prismatic breaking to moderate medium subangular blocky structure; hard when dry firm moist; thin nearly continuous clay skins; violently calcareous with numerous small lime spots; clear smooth boundary.
9702	$C_{1}ca1$	32-38 inches	Pale brown (1Y 6/2.5 dry) to brown (1Y 5/3 moist) silty clay loam; very weak coarse prismatic breaking to moderate medium subangular blocky structure; hard when dry friable when moist; thin patchy clay skins on vertical faces of peds; violently calcareous with numerous lime spots; gradual smooth boundary.
9703	$C_{1}ca2$	38-48 inches	Light brownish gray (10YR 6.5/2 dry) to grayish brown (10YR 5/2.5 moist) light silty clay loam; weak medium to coarse subangular blocky structure; hard when dry, friable moist; few thin patchy clay skins; violently calcareous with a few lime spots; gradual smooth boundary.
9704	C_{2}	48-57 inches	Light gray (10YR 7/2 dry) to brown (10YR 5/3 moist) silt loam; very weak medium subangular blocky structure; slightly hard when dry, very friable moist; violently calcareous.
9705	C_{3}	57-116 inches (Sampled to 72 inches)	Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) silt loam; massive; slightly hard when dry, very friable moist; violently calcareous.
	D	116-132 inches	Pink (7.5YR 7/4 dry) to brown (7.5YR 5/4 moist) silt loam; massive; slightly hard when dry, very friable moist; violently calcareous.

Bureau of Public Roads Samples

Ap	0 to 3 inches
B_{21}	6 to 15 inches
C_{3}	57 to116 inches

SCS-420 a
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Rocky Ford silty clay loam a/ SOIL Nos. 860Colo-50-3 LOCATION Prowers County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14659-14661 January, 1966

Depth (In.)	Horizon	1B1a Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1 Clay: Carbonate	3A1a Clay: Non-carbonate	Coarse fragments: 2A2 > 2 (<19) Pct.	Coarse fragments: 2 – 19 Pct. of < 76 mm	Coarse fragments: 19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0–5	Ap1	12.5	53.7	33.8	0.1b	0.4c	0.4c	1.3c	10.3c	30.2	23.5	41.4	2.2	Tr.	34	Tr.		
5–11	Ap2	12.0	54.1	33.9	0.1b	0.3c	0.4c	1.2c	10.0c	28.4	25.7	39.2	2.0	2	32	Tr.		
11–16	AC	13.5	60.7	25.8	0.3c	0.2c	0.3c	1.1c	11.6c	38.2	22.5	50.6	1.9	4	22	Tr.		

Depth (In.)	6A1a Organic carbon a/ Pct.	6B1a Nitrogen Pct.	C/N		6E1c Carbonate as $CaCO_3$ Pct.		Bulk density: 4A1c 30-cm. g/cc	Bulk density: 4A1b Air-Dry g/cc	4H1 COLE a/	Water content: 4B3 30-cm. Pct.	Water content: 4H1b 1/3-Bar Pct.	Water content: 4B2 2-Bar Pct.	4B2 15-Bar Pct.	4C1 1/3-Bar to 15-Bar in./in.	pH: 8C1b Sat. Paste	pH: 8C1a 1:1	pH: 8C1a 1:10
0–5	1.22	0.117	10		6		1.29	1.49	0.052	28.5	25.0	19.0	14.9	0.13	7.7	7.8	8.4
5–11	1.25	0.119	10		6		1.39	1.64	0.056	29.2	25.5	20.5	16.1	0.13	7.6	7.8	8.5
11–16	0.55	0.065	8		9								12.5		7.6	7.9	8.6

Depth (In.)	Extractable bases 5E1a: Ca	Mg	6P2a Na	6Q2a K			Cat. Exch. Cap. 5A1a NH_4OAc	8A1: Ca	Mg	6P1a Na	6Q1a K		Water extract from saturated paste: CO_3	HCO_3	Cl	SO_4	8A1a Electrical conductivity
	meq/100 g							meq/liter									mmho/cm
0–5			1.5	1.1			20.1			8.9	0.5						2.0
5–11			1.3	1.3			20.9			6.4	0.6						1.4
11–16			1.2	0.8			18.5			6.8	0.4						1.6

Depth (In.)	8A Water at Saturation	5H2 Exchangeable Na		Gypsum	Ratios to Clay: 8H1 NH_4OAc	8H2 NH_4OAc	8H1 15-Bar

a. This soil was sampled to study the effects of irrigation for about 50 years on certain soil characteristics. Only the upper horizons were sampled. The soil should be compared with Colby 860Colo-50-1 and 860Colo-50-2 which were not irrigated.

Soil Type: Rocky Ford silty clay loam
Soil Nos.: S60 Colo-50-3
Location: 750 feet west and 750 feet south of the east quarter corner, Sec. 13, T22S, R45W, Prowers County, Colorado.
Climate: Continental climate, average annual precipitation 13 to 15 inches, frost-free season 165 days.
Elevation: 3,550 feet.
Parent Material: Loess.
Physiographic Position: Upland.
Relief: Nearly level, 0-1 percent slopes.
Drainage: Good.
Moisture: Moist.
Water Table: None.
Stoniness: None.
Salt or Alkali: Possible slight salinity.
Erosion: Siltation.
Present Use: Irrigated cropland - sorghum.
Described by: James P. Pannell, November 15, 1960.

Horizon and Lincoln Lab. No.	
Ap1 14659	0 to 5 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist), dark grayish brown (10YR 3.5/2 moist crushed) silty clay loam; weak fine granular structure; dry hard, moist firm; strongly effervescent; clear smooth boundary.
Ap2	5 to 11 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) dark grayish
AC 14661	11 to 16 inches. Brown (10YR 5/3 dry) to dark brown (10YR 4/3 moist) brown (10YR 4.5/3 moist crushed) silt loam; weak medium subangular blocky structure to weak fine subangular blocky; dry slightly hard, moist friable; violently effervescent; some mixing of upper horizons in worm and root holes; clear smooth boundary.

SCS-420 a
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Rocky Ford silty clay loam a/ SOIL Nos. S60Colo-50-4 LOCATION Prowers County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14662-14664 January 1966

Depth (In.)	Horizon	1B1a Size class and particle diameter (mm) Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: Very coarse (2–1)	Coarse (1–0.5)	Medium (0.5–0.25)	Fine (0.25–0.1)	Very fine (0.1–0.05)	Silt: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1 Clay: Carbonate	3A1a Clay: Non-carbonate	Coarse fragments 2A2 (>2 to <19) Pct.	2 – 19 Pct. of < 76 mm	19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0-4	Ap1	10.0	56.5	33.5	0.3b	0.5c	0.4d	1.4d	7.4d	22.4	34.1	30.8	2.6	1	33	Tr.		
4-9	Ap2	8.4	54.8	36.8	0.2b	0.3d	0.3d	1.1d	6.5d	21.3	33.5	28.6	1.9	Tr.	37	Tr.		
9-18	AC	20.9	55.8	24.2	0.2d	0.4d	0.6d	2.8d	16.0d	34.1	21.7	52.2	4.9	5	19	Tr.		

Depth (In.)	6A1a Organic carbon a/ Pct.	6B1a Nitrogen Pct.	C/N	6E1a Carbonate as $CaCO_3$ Pct.	Bulk density: 4A1a 30-cm. g/cc	4A1b Air-Dry g/cc	4B1 COLE b/	Water content: 4B3 30-cm. Pct.	4B1b 1/3-Bar Pct.	4B2 2-Bar Pct.	4B2 15-Bar Pct.	4C1 1/3-Bar to 15-Bar in/in	pH: 8C1b Sat. Paste	8C1a 1:1	8C1a 1:10
0-4	1.66	0.140	12	7	1.22	1.43	0.056	30.3	27.8	21.8	15.0	0.16	7.7	7.9	8.4
4-9	1.53	0.132	12	7	1.38	1.62	0.056	28.2	27.8	21.0	15.7	0.17	7.8	7.9	8.5
9-18	0.69	0.087	8	11							12.2		7.7	7.9	8.7

Depth (In.)	Extractable bases 5B1a: Ca	Mg	6P2a Na	6Q2a K	Cat. Exch. Cap. 5A1a NH_4OAc	8A1 Water extract from saturated paste: Ca	Mg	6P1a Na	6Q1a K	CO_3	HCO_3	Cl	SO_4	8A1a Electrical conductivity mmho/cm
	meq/100 g					meq/liter								
0-4			0.8	1.5	22.5			4.6	0.8					1.2
4-9			0.6	1.2	22.9			2.8	0.4					0.8
9-18			0.6	0.9	17.0			3.3	0.4					0.9

Soil Type: Rocky Ford silty clay loam
Soil Nos.: S60Calo-50-4
Location: 0.3 mile north and 100 feet east of the south quarter corner, Sec. 34, T22S, R43W, Prowers County, Colorado.
Climate: Continental climate, average annual precipitation 13 to 15 inches, frost-free season 165 days.
Elevation: 3,550 feet.
Parent Material: Loess.
Physiographic Position: Upland.
Relief: Nearly level, 0-1 percent slopes.
Drainage: Good.
Moisture: Moist.
Water Table: None.
Stoniness: None.
Salt or Alkali: Possible slight salinity.
Erosion: Siltation.
Present Use: Irrigated cropland - sorghum.
Described by: James P. Bunnell, November 18, 1960.

Horizon and
Lincoln
Lab. No.

Ap1
14660 0 to 4 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 3.5/2 moist and crushed) silty clay loam; weak very fine granular structure; dry slightly hard, moist friable; violently effervescent; abrupt smooth boundary.

[redacted]

moderate fine granular; dry hard, moist firm; violently effervescent; abrupt smooth boundary.

AC
14664 9 to 18 inches. Brown (10YR 5/3 dry) to brown (10YR 4.5/3 moist and crushed) silt loam; weak medium subangular blocky structure to very weak very fine granular; dry slightly hard, moist very friable; violently effervescent; few worm casts; clear smooth boundary.

C1 18 to 30 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3.5 moist and crushed) silt loam; very weak medium subangular blocky to massive structure; dry soft, moist very friable; violently effervescent with

SCS-420 a
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Rocky Ford silty clay loam a/ SOIL Nos. S60Colo-50-7 LOCATION Prowers County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14676-14678 January, 1966

Depth (In.)	Horizon	1B1a Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1 Clay 3A1a Carbonate	3A1a Noncarbonate	Coarse fragments 2/2 > 2 (<19) Pct.	2 – 19 Pct. of < 76 mm	19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0-6	Ap1	17.2	41.5	41.3	0.2	0.9b	1.6b	5.9b	8.6b	22.0	19.5	33.9	8.6	1	40	-		
6-13	Ap2	18.1	40.1	41.8	0.1	1.0b	1.8b	6.6b	8.6b	18.0	22.1	30.4	9.5	1	41	-		
13-18	AC	37.0	39.2	23.8	0.2	1.1b	3.0b	12.7b	20.0b	27.5	11.7	55.0	17.0	2	22	Tr.		

Depth (In.)	6A1a Organic carbon a/ Pct.	6B1a Nitrogen Pct.	C/N	6E1c Carbonate as $CaCO_3$ Pct.	Bulk density: 4A1a 30-cm. g/cc	Bulk density: 4A1b Air-Dry g/cc	4B1 COLE a/	Water content: 4B3 30-cm. Pct.	Water content: 4B1b 1/3-Bar Pct.	Water content: 4B2 2-Bar Pct.	Water content: 4B2 15-Bar Pct.	Water content: 4C1 1/3-Bar to 15-Bar In/In.	pH: 8C1b Sat. Paste	pH: 8C1a 1:1	pH: 8C1a 1:10
0-6	1.70	0.155	11	6	1.36	1.66	0.068	30.0	26.4	21.1	17.5	0.12	7.8	7.8	8.5
6-13	1.30	0.127	10	6	1.39	1.68	0.064	28.9	26.2	21.8	18.6	0.10	7.7	7.9	8.6
13-18	0.52	0.062	8	6	1.51	1.68	0.036	23.2	21.6	16.9	10.7	0.16	7.7	7.9	8.5

Depth (In.)	Extractable bases 5E1a: Ca	Mg	6P2a Na	6Q2a K	Cat. Exch. Cap. 5A1a NH_4OAc	8A1 Water extract from saturated paste: Ca	Mg	6F1a Na	6Q1a K	CO_3	HCO_3	Cl	SO_4	8A1a Electrical conductivity
	meq/100 g					meq/liter								mmho/cm
0-6			1.4	1.3	23.6			6.6	0.5					1.5
6-13			1.4	1.2	23.4			7.6	0.5					1.6
13-18			1.0	0.8	14.4			8.3	0.4					2.0

Depth (In.)	8A Water at Saturation Pct.	5H2 Exchangeable Na Pct.	Gypsum Pct.	Ratios to Clay: 8B1 NH_4OAc CEC	8B2 NH_4OAc CEC a/	8B1 15-Bar Water
0-6	72.8	4		0.57	0.59	0.42
6-13	63.4	4		0.56	0.57	0.44
13-18	50.0	4		0.60	0.65	0.45

a. This soil was sampled to study the effects of irrigation for about 50 years on certain soil characterisitics. Only the upper horizons were sampled. The soil should be compared with Colby S60Colo-50-5 and S60Colo-50-6 which were not irrigated.
b. 5-25% carbonate.
c. 7.7 kg/m^2 to 18 inches.
d. Coefficient of Linear Extensibility.
e. Noncarbonate clay.

Soil Type: Rocky Ford silty clay loam

Elevation: 3,450 feet.
Parent Material: Alluvium.
Physiographic Position: Stream terrace.
Relief: Nearly level, 0-1 percent slopes.
Drainage: Good.
Moisture: Moist.
Water Table: None.
Stoniess: None.
Salt or Alkali: Possible slight salinity.
Erosion: Siltation.
Present Use: Irrigated cropland - alfalfa.
Described by: James P. Pannell, September, 1960.

Horizon and Lincoln Lab. No.	
Ap1 14676	0 to 6 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 3.5/2 moist and crushed) silty clay loam; moderate fine granular structure; dry hard, moist firm; violently effervescent; clear smooth boundary.
Ap2 14677	6 to 13 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 3.5/2 moist and crushed) silty clay loam; weak coarse subangular blocky structure to weak fine subangular blocky; dry hard, moist firm; violently effervescent; clear smooth boundary.
AC 14678	13 to 18 inches. Brown (10YR 5/3 moist) to dark brown (10YR 3.5/3 moist and 4/3 moist crushed) loam; weak coarse subangular blocky structure to weak fine granular; dry slightly hard, moist friable; violently effervescent; gradual smooth boundary.
C1	18 to 30 inches. Brown (10YR 5/3 dry and 4/3 moist and crushed) stratified silt loam and loam; very weak coarse subangular blocky structure to massive; dry soft, moist very friable; violently effervescent; clear smooth boundary.
C2	30 to 60 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist and crushed) stratified loam, silt loam and very fine sandy loam; massive; dry soft, moist very friable; violently effervescent; a very few

SCS-420 a
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Rocky Ford silty clay loam 1/ SOIL Nos. S60Colo-70-8 LOCATION Prowers County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14679-14681 January, 1966

Depth (in.)	Horizon	1Bla Size class and particle diameter (mm) Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: Very coarse (2–1)	Coarse (1–0.5)	Medium (0.5–0.25)	Fine (0.25–0.1)	Very fine (0.1–0.05)	Silt: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1 Clay Carbonate	3A1a Non-carbonate	Coarse fragments 2A2 > 2 (<19) Pct.	2 – 19 Pct. of < 76 mm	19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0–8	Ap1	19.5	47.2	33.3	0.1	0.8b	1.3b	6.7b	10.6b	23.1	24.1	38.1	8.9	1	32	Tr.		
8–12	Ap2	19.7	46.5	33.8	0.1	0.7b	1.3b	7.0b	10.6b	22.8	23.7	38.0	9.1	1	33	-		
12–16	AC	34.2	39.4	26.4	0.1	0.9b	2.2b	13.5b	17.5b	25.7	13.7	52.1	16.7	3	23	-		

Soil Type: Rocky Ford silty clay loam
Soil Nos.: S60Colo-50-8
Location: 0.3 mile north and 100 feet east of the west quarter corner, Sec. 33, T22S, R45W, Prowers County, Colorado.
Climate: Continental climate, average annual precipitation 13 to 15 inches, frost-free season 165 days.
Elevation: 3,585 feet.
Parent Material: Alluvium.
Physiographic Position: Stream terrace.
Relief: Nearly level, 0-1 percent slopes.
Drainage: Good.
Moisture: Moist.
Water Table: None.
Stoniness: None.
Salt or Alkali: Possible slight salinity.
Erosion: Siltation.
Present Use: Irrigated cropland - corn.
Described by: James P. Pannell, September, 1960.

Horizon and Lincoln Lab. No.	
Ap1 14679	0 to 8 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 3.5/2 moist and 4/2 moist crushed) silty clay loam; weak fine granular structure; dry hard, moist firm; violently effervescent; clear smooth boundary.
Ap2 14680	8 to 12 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 3.5/2 moist and 4/2 moist crushed) silty clay loam; weak coarse subangular blocky structure breaking to weak fine subangular blocky; dry hard, moist firm, violently effervescent; clear smooth boundary.
AC 14681	12 to 16 inches. Brown (10YR 5/3 dry) to brown (10YR 4/3 moist and 4/2.5 moist crushed) silty clay loam; weak coarse subangular blocky structure breaking to weak to medium fine subangular blocky; dry hard, moist firm; violently effervescent; clear smooth boundary.
C1	16 to 37 inches. Light yellowish brown (10YR 6/4 dry) to brown (10YR 5/3 moist and crushed) silt loam; very weak coarse subangular blocky to massive structure; dry soft, moist very friable; violently effervescent; clear smooth boundary.
C2	37 to 45 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist and crushed) very fine sandy loam; massive; dry soft, moist very friable; violently effervescent; clear smooth boundary.
C3	45 to 60 inches plus. Light yellowish brown (10YR 6/4 dry) to brown (10YR 5/3 moist and crushed) silt loam weakly stratified; massive; dry soft, moist very friable; violently effervescent with a few lime mottles.

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Stecum gravelly sandy loam LOCATION Trout Creek Watershed, Chaffee County, Colorado

SOIL NOS. S57Colo-8-4 LAB. NOS 8189-8192

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			3A1 2A2	TEXTURAL CLASS

Soil Type: Stecum gravelly sandy loam
Soil Nos.: S57Colo-8-4
Location: Trout Creek Watershed, Chaffee County, Colorado.
Physiographic Position: Mountain side. Elevation 9,905 feet.
Topography: Steeply sloping convex south-facing mountain slope of about 35 percent gradient.
Drainage: Well drained.
Vegetation: Mountain mahogany, sage, spike muhly, fescue, and grama grass.
Use: National Forest lands.
Collected by: John Retzer, A. J. Cline, E. M. Payne, T. Baber, W. Hunter, E. Wesswick, September 18, 1957.
Described by: A. J. Cline.

Horizon and Lincoln Lab. No.	
A1 8189	0 to 3 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) gravelly sandy loam; soft when dry, very friable when moist; moderate fine granular structure; noncalcareous, approximate pH 6.8; about 25 percent of this horizon is gravel with some accumulation of gravel due to differential erosion on the surface of the soil; lower boundary clear and smooth.
AB 8190	3 to 9 inches. Grayish brown or light brownish gray (10YR 5.5/2 dry) to dark grayish brown (10YR 4/2 moist) gravelly light sandy loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure, breaking to moderate medium granules; noncalcareous, approximate pH 7.0; there are a very few thin patchy clay skins on some of the soil aggregates; about 40 percent of the horizon is gravel; lower boundary gradual and smooth.
C1 8191	9 to 13 inches. Brown or pale brown (10YR 5.5/3 dry) to brown or dark brown (10YR 4/3 moist) gravelly sand; slightly hard when dry, very friable when moist; single grained; noncalcareous, approximate pH 7.2; about 75 percent of this horizon is gravel and stone; lower boundary gradual and smooth.
C2 8192	13 to 21 inches. This horizon is partially disintegrated granite and biotite schist rocks.

Remarks: Profile upslope in position from Stecum, Soil Nos. S57Colo-8-5.

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE [redacted] LOCATION Trout Creek Watershed, [redacted]

gravelly sandy loam

SOIL NOS. S57Colo-8-5 LAB. NOS. 8103-8105

DEPTH	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL
	VERY	[illegible]			VERY						

Soil Type: Stecum gravelly sandy loam
Soil Nos.: 857Colo-8-5
Location: Trout Creek Watershed, Chaffee County, Colorado.
Physiographic Position: Mountain side. Elevation 9,805 feet.
Topography: Steeply sloping convex south-facing mountain slope of about 35 percent gradient.
Drainage: Well drained.
Vegetation: Blue grama, sage, fescue, and scattered aspen and mountain mahogany.
Use: National Forest lands.
Collected by: John Retzer, A. J. Cline, E. M. Payne, T. Baber, W. Hunter and E. Wesswick, September 18, 1957.
Described by: A. J. Cline.

Horizon and Lincoln Lab. No.	
A1 8193	0 to 4 inches. Dark gray (10YR 4/1 dry) to black or very dark gray (10YR 2.5/1 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; moderate fine granular structure; noncalcareous; about 15 percent of this horizon is gravel; lower boundary clear and smooth.
AC 8194	4 to 9 inches. Brown (10YR 5/3 dry) to dark brown (10YR 3/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; very weak fine subangular blocky structure; breaking to moderate fine granules; noncalcareous; there are a few thin patchy clay skins on the surfaces of the soil aggregates in this horizon; lower boundary gradual and smooth; about 20 percent of this horizon is gravel.
C1 8195	9 to 20 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4.5/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; very weak medium subangular blocky structure, breaking to single grains; noncalcareous; about 40 to 50 percent of this horizon is gravel and fractured rock fragments; lower boundary gradual and smooth.
Cr	20 inches plus. Partially weathered granite bedrock.

Remarks: Profile intermediate in position on slope between Stecum Soil Nos. 857Colo-8-4 and 857Colo-8-6.

SOIL SURVEY LABORATORY Lincoln, Nebr. November 1958

SOIL TYPE Stecum gravelly sandy loam **LOCATION** Trout Creek Watershed, Chaffee County, Colorado

SOIL NOS. S57Colo-8-6 **LAB. NOS.** 8196-8199

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-2½	A1	29.0	24.4	8.0	9.4	5.0	17.3	6.9	17.0	9.5	27	ccsl
2½-5	AB	25.1	20.4	7.0	9.5a	4.8a	22.9	10.3	19.8	12.5	39	cosl
5-8	C1	18.5	22.8	9.5	14.4a	6.3a	16.7	11.8	21.1	8.9	54	cosl
8-17+	C2	24.7	29.9	10.1	15.0a	5.1a	7.6	7.6	15.2	4.7	68	lcos

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C'N	6C1a Free Iron Fe_2O_3%		6E1a $CaCO_3$ equivalent %	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.0			3.70	0.181	20	1.4		<1			5.0
7.1			1.15	0.076	15	1.7		<1			4.5
7.3			0.84	0.035	24	1.9		<1			5.2
7.4			0.34	0.011	31	1.5		<1			5.0

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	Sum Bases 5B1a	Sum Cations 5A3a	Ca/Mg 8D3
	milliequivalents per 100g. soil →							me/100g.		
11.8	9.6	1.6	3.6	<0.1	0.6	100	77	11.8	15.4	6.0
11.0	8.6	1.6	2.3	<0.1	0.6	98	82	10.8	13.1	5.4
11.3	9.6	2.1	2.3	<0.1	0.4	107	84	12.1	14.4	4.6
11.0	11.4	2.4	1.8	<0.1	0.3	128	89	14.1	15.9	4.8

a. Common flakes of mica

Soil Type: Stecum gravelly sandy loam
Soil Nos.: S57Colo-8-6
Location: Trout Creek Watershed, Chaffee County, Colorado.
Physiographic Position: Mountain slope. Elevation 9,680 feet.
Topography: Steeply sloping south-facing moutain side having about 30 percent gradient.
Drainage: Well drained.
Vegetation: Blue grama, sage, fescue, and scattered growth of aspen.
Use: National Forest lands.
Collected by: John Retzer, A. J. Cline, E. M. Payne, T. Baber, W. Hunter, and E. Wesswick, September 18, 1957.
Described by: A. J. Cline.

Horizon and Lincoln Lab. No.	
A1 8196	0 to 2½ inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) sandy loam; soft when dry, very friable when moist; moderate fine granular structure; noncalcareous, approximate pH 6.8; approximately 15 percent of this horizon is gravel; lower boundary clear and smooth.
AB 8197	2½ to 5 inches. Brown (10YR 5/3 dry) to dark brown (10YR 3/3 moist) gravelly sandy loam; slightly hard when dry, friable when moist; moderate fine granular structure; noncalcareous, approximate pH 6.8; this horizon is bordering on a textural B horizon and contains thin patchy clay skins on both the horizontal and vertical faces of some aggregates; lower boundary gradual and smooth; approximately 30 percent of this horizon is gravel.
C1 8198	5 to 8 inches. Brown or yellowish brown (10YR 5/3.5 dry) to dark brown or dark yellowish brown (10YR 4/3.5 moist) gravelly loamy sand; slightly hard when dry, friable when moist; weak coarse granular structure; noncalcareous, approximate pH 7.2; there are some patchy clayskins principally on the surface of the gravel in this horizon; about 75 percent of this horizon is gravel; lower boundary gradual and smooth.
C2 8199	8 to 17 inches. Yellowish brown (10YR 5/4 dry) to dark yellowish brown (10YR 4/4 moist) gravelly sand; slightly hard when dry, friable when moist; massive; noncalcareous, approximate pH 7.4; this is a horizon of partially weathered granitic bedrock and the consistence of the rock increases with depth. Approximately 90 percent of the horizon delineated is weathered rock and gravel.

Remarks: Profile downslope in position from Stecum, Soil Nos. S57Colo-8-5.

SOIL SURVEY LABORATORY Lincoln, Nebr. 3/17/58

SOIL TYPE Tabernash **LOCATION** Grand County, Colorado

SOIL NOS. S55Colo-25-5 **LAB. NOS.** 2886-2892

DEPTH	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent)									3A1	2A2	TEXTURAL
	VERY				VERY							

Soil Type: Tabernash loam
Soil Nos.: S55Colo-25-5
Location: Approximately the NE 1/4 of the SE 1/4, Sec. 27, T1S, R76W, Grand County, Colorado, approximately 1.8 mile north and 380 feet west of the Forest Service headquarters building on the road to Fraser.
Physiographic Position: Outwash terrace.
Topography: Gently sloping convex area of about 4 percent gradient facing east.
Drainage: Well drained.
Vegetation: Forest cover of lodgepole pine with thin understory of vaccinium.
Use: Forest land or grazing land.
Collected by: James Allen and A. J. Cline, August, 1955.

Horizon and Lincoln Lab. No.	
Ao - Aoo	1 to 0 inch. Gray (10YR 5/1 dry) to black (10YR 2/1 moist) thin mat of undecomposed and partially decomposed organic materials. The surface one-fourth inch consists almost entirely of last year's fall of pine needles; the horizon rests abruptly on the horizon below.
A1 2886	0 to 1½ inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loam; soft when dry, very friable when moist; weak to moderate medium and coarse crumb structure; slightly acid; the color of this horizon is not uniform and contains streaks and mottles of 10YR 2/1 and 10YR 4/2 materials; lower boundary clear and smooth.
A2 2887	1½ to 5½ inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) loam; soft when dry, very friable when moist; weak coarse platy structure breaking to weak to moderate coarse and medium crumb; approximately neutral in reaction; lower boundary gradual and wavy.
B1 2888	5½ to 8 inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) clay loam; slightly hard when dry, friable when moist; weak to moderate fine subangular blocky structure; approximately neutral in reaction; this horizon has thin nearly continuous tonhautchen; the surfaces of the soil aggregates are coated with 10YR 7/2 colored materials probably from the horizon above; lower boundary clear and wavy.
B21 2889	8 to 15 inches. Light brown (7.5YR 6/4 dry) to dark brown (7.5YR 4/4 moist) heavy clay loam or light clay; very hard when dry, firm when moist; moderate to strong fine subangular blocky structure; approximately neutral in reaction; moderate continuous tonhautchen; the surfaces of the soil aggregates are thinly coated with 10YR 7/2 colored materials; lower boundary clear and smooth.
B22 2890	15 to 23 inches. Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) heavy clay loam or light clay; very hard when dry, firm when moist; moderate coarse prismatic structure breaking to strong medium angular blocks; approximately neutral in reaction; strong continuous tonhautchen; the surfaces of the soil aggregates are coated with 10YR 7/2 colored materials principally on vertical faces; lower boundary gradual and smooth.
B3 2891	23 to 27 inches. Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) gravelly clay loam in texture; hard when dry, friable when moist; weak coarse and medium subangular blocky structure; approximately neutral in reaction; this horizon contains thin patchy tonhautchen; about 30 percent of this horizon is cobble and gravel; lower boundary gradual and smooth.
D 2892	27 to 36 inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) cobbly sandy loam; hard when dry, firm when moist; massive; about 70 percent of this horizon is cobble and gravel but the horizon appears to be weakly cemented.

SOIL SURVEY LABORATORY Lincoln, Nebr. 3/17/58

SOIL TYPE Tabernash loam **LOCATION** Grand County, Colorado

SOIL NOS. S55Colo-25-6 **LAB. NOS.** 2893-2898

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	3A1 0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-7	A2	16.9	15.0	2.8	5.3	2.3	45.3	12.4	27.0	23.6	8	l
7-12	B1	6.7	5.4	3.9	7.8	9.3	39.1	27.8	32.8	20.2	4	cl
12-22	B21	3.6	4.5	4.0	8.3	9.3	34.2	36.1	30.3	18.2	2	cl
22-32	B22	3.7	4.5	4.0	8.6	9.4	35.3	34.5	31.7	18.2	1	cl
32-38	B3	5.0	6.1	4.8	9.4	9.3	32.9	32.5	30.8	16.8	2	cl
38-48+	C	10.1	7.6	4.6	8.4	8.3	30.5	30.5	28.1	15.5	4	cl

pH 8C1a	pH 8C1a	ORGANIC MATTER 6A1a ORGANIC	6B1a NITRO-	6C1a Free Iron Fe_2O_3	MOISTURE TENSIONS 4B2 1/10	1/3	15

Soil Type: Tabernash loam
Soil Nos.: S55Colo-25-6
Location: Approximately the SW 1/4 of the NE 1/4, Sec. 34, T1S, R76W, Grand County, Colorado. About 1.1 miles north and 190 feet west of the Forest Service headquarters building on the road to Fraser.
Physiographic Position: Outwash terrace.
Topography: Gently sloping convex area of approximately 4 percent gradient facing east.
Drainage: Well drained.
Vegetation: Principally lodgepole pine with a thin understory of vaccinium and grasses.
Use: Timberland and limited grazing.
Collected by: James Allen and A. J. Cline, August 1955.

Horizon and Lincoln Lab. No.	
Ao	1 to 0 inch. Gray (10YR 5/1 dry) to very dark gray (10YR 3/1 moist) partially decomposed organic material; the horizon rests abruptly on the horizon below.
A2 2893	0 to 7 inches. Light gray (10YR 7/2 dry) to grayish brown (10YR 5/2 moist) loam; soft when dry, very friable when moist; weak coarse and medium platy structure breaking to weak to moderate fine crumb; approximately neutral; lower boundary gradual and wavy.
B1 2894	7 to 12 inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) clay loam; slightly hard when dry, friable when moist; moderate fine angular and subangular blocky structure; approximately neutral in reaction; thin continuous tonhautchen; the surfaces of the soil aggregates of this horizon have a strong coating of 10YR 7/2 materials; lower boundary gradual and wavy.
B21 2895	12 to 22 inches. Light brown (7.5YR 6/4 dry) to brown (7.5YR 5/4 moist) silty clay; extremely hard when dry, very firm when moist; weak to moderate very coarse prismatic structure breaking to strong medium angular blocks; approximately neutral in reaction; thick continuous tonhautchen; the faces of the soil aggregates of this horizon have a moderate coating of 10YR 7/2 materials; lower boundary gradual and smooth.
B22 2896	22 to 32 inches. Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) silty clay; extremely hard when dry, very firm when moist; weak to moderate very coarse prismatic breaking to moderate to strong coarse and medium angular blocks; approximately neutral in reaction; thick continuous tonhautchen; the surfaces of the soil aggregates of this horizon have a thin coating of 10YR 7/2 colored materials and some dark organic staining; lower boundary gradual and smooth.
B3 2897	32 to 38 inches. Brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) sandy clay; hard when dry, friable when moist; weak coarse subangular blocky structure; approximately neutral in reaction; thin nearly continuous tonhautchen; the surfaces of the soil aggregates in this horizon have a very thin indistinct coating of 10YR 7/2 materials; lower boundary gradual and smooth.
C 2898	38 to 48 inches plus. Yellowish brown (10YR 5/4 dry) to dark yellowish brown (10YR 4/4 moist) gravelly sandy clay loam; hard when dry, friable when moist; massive; approximately neutral in reaction; this horizon grades into waterwashed cobble and gravel strata.

SOIL SURVEY LABORATORY Lincoln, Nebr. June 1961

SOIL TYPE *Tex sandy loam **LOCATION** Gunnison County, Colorado

SOIL NOS. S59Colo-26-3 **LAB. NOS.** 11998-12003

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	3A1 0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-2	A1	14.4	17.5	7.6	11.8	8.7	27.3	12.7	28.0	14.0	38	cosl
2-10	A2	15.3	16.7	9.7	15.7	8.4	27.7	6.5	30.6	13.3	33	cosl
10-14	A2&B1	16.6	17.9	9.7	17.3	9.4	22.3	6.8	30.8	9.7	41	cosl
14-24	A2&B2	20.9	21.7	11.2	16.6	8.1	16.2	5.3	23.6	8.8	39	lcos
24-45	B3C	20.8	19.5	10.5	17.6	9.4	16.1	6.1	26.1	8.3	39	lcos
45-58	C	30.0	24.4	11.6	15.9	5.6	8.3	4.2	16.7	4.4	45	cos/lcos

8C1a 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6C1a Free Iron Fe_2O_3%		6E1c $CaCO_3$ equivalent %		MOISTURE TENSIONS 4B1a 1/10 ATMOS. %	4B1a 1/3 ATMOS. %	4B2 15 ATMOS. %
5.9			2.95	0.118	25	1.0						5.5
5.8			0.51	0.022	23	1.0				14.8	9.0	3.1
5.9			0.15	0.007		0.9				11.1	6.6	2.5
6.0			0.09	0.007		1.0				10.2	6.4	2.2
6.3			0.04			0.9				10.6	6.7	2.2
6.7			0.02			0.9		< 0.1		7.2	4.6	1.6

5A1a CATION EXCHANGE CAPACITY NH_4OAc	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. % NH_4OAc EXCH. 5C1	Base Sat. % on Sum Cations 5C3	Sum Ext. Bases 5B1a	Sum Ext. Cations 5A3a	Ca/Mg 8D3		O. D. Bulk Density g/cc
← milliequivalents per 100g. soil →												
12.5	7.1	1.1	8.8	< 0.1	0.4	69	49	8.6	17.4	6.4		
5.9	3.3	0.7	3.5	< 0.1	0.2	71	54	4.2	7.7			
4.1	2.2	0.4	2.4	< 0.1	0.1	66	53	2.7	5.1			
3.4	2.0	0.7	1.6	< 0.1	0.1	82	64	2.8	4.4			
3.3	2.1	0.8	1.4	< 0.1	0.1	91	68	3.0	4.4			
2.5	1.6	0.7	0.9	< 0.1	0.1	96	73	2.4	3.3			

Soil Type: *Tex sandy loam
Date: Sept. 1959, by J. Y. Nishimura, W. Goddard, J. S. Allen, L. Juve, C.J. Fox
Area: Gunnison County, Colorado
Location: NE¼ of Sec. 14, T. 13 S., R. 83 W. Forest Hill road-immediately east of fork in trail. photo 2717.
Parent Material: Glacial moraine dominantly of granitic origin.
Physiographic position: Upland moraine position about 1/3 down slope. Elevation about 9900 feet.
Topography: Hummocky. SW exposure with 32 percent gradient.
Drainage: Well-drained
Vegetation: Lodgepole pine with a 5 percent ground cover of kinnikinick. Mosses and lichens on rocks.
Use: National Forest land. Described by: Charles J. Fox.
Soil Nos.: S-59-Colo-26-3

Lincoln Horizon / Lab. No.			
	A_{oo}	1-½ inches	Loose pine needles; approximate pH 4.8.
	A_o	½-0 inch	Partially decayed pine needles mixed with some mineral matter. Approximate pH 5.2.
11998	A_1	0-2 inches	Dark grayish brown (10YR 4/2 dry) to very dark grayish brown (10YR 3/2 moist) gravelly sandy loam; single grain and weak very fine granular structure; soft when dry, very friable when moist; nonplastic when wet; about 2 percent of horizon consists of rounded glacial stones; approximate pH 5.5; roots plentiful; lower boundary abrupt and smooth.
11999	A_2	2-10 inches	Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) gravelly sandy loam; weak very fine granular structure; soft when dry, very friable when moist, nonplastic when wet; a very few hair-line discontinuous bands that are higher in chroma; clean sand grains; approximate pH 5.2; roots plentiful; lower boundary clear and wavy.
12000	A_2 & B_1	10-14 inches	Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) gravelly loamy sand; weak medium subangular blocky structure breaking to single grains and weak very fine granules; loose when dry or moist, nonplastic when wet; three ¼ to ½" bands in this horizon that are light brown (7.5YR 6/4 dry) to brown (7.5YR 5/4 moist); bands are gravelly sandy loam and [illegible]
			lightly stained; approximate pH 5.0; roots plentiful; lower boundary clear and wavy.
12001	A_2 & B_2	14-24 inches	Very pale brown (10YR 7/4 dry) to yellowish brown (10YR 5/4 moist) gravelly loamy sand; weak medium subangular blocky structure breaking to single grains and weak very fine granules; soft when dry, very friable when moist, nonplastic when wet; sand grains lightly stained; approximate pH 5.0. Three or four ¼ to ½" bands in this horizon that are of gravelly clay loam texture; light brown (7.5YR 6/4 dry) to dark brown (7.5YR 4/4 moist); angular blocky structure breaking to moderate fine granules; hard when dry, very firm when moist, plastic when wet; sand grains stained, approximate pH of bands 6.0. Roots in this horizon plentiful; lower boundary clear and wavy.
12002	B_3	24-45 inches	Very pale brown (10YR 7/4 dry) to yellowish brown (10YR 5/4 moist) gravelly loamy sand; single grain structure; loose when dry or moist, nonplastic when wet; sand grains lightly stained; approximate pH 5.0. Five ¼ to 1" bands in this horizon are light brown (7.5YR 6/4 dry) to dark brown (7.5YR 4/4 moist) gravelly clay loam; angular blocky structure breaking to moderate fine granules; hard when dry, very firm when moist, plastic when wet; approximately pH of sands 6.0. Rounded rocks make up 10 percent of the volume of this horizon; roots few; lower boundary gradual and wavy.
12003	C	45-58 inches	Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) gravelly loamy sand; single grain structure; loose when dry or moist, nonplastic when wet; approximate pH 6.0; few rounded stones; roots none.

Remarks: Samples of horizons below 10" depth were collected excluding the band materials; i.e., samples represent the inter-band materials. Rounded

SOIL SURVEY LABORATORY Lincoln, Nebr. June 1961

SOIL TYPE *Tex sandy loam **LOCATION** Gunnison County, Colorado

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	3A1 0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
½-4	A2	22.3	13.3	5.9	9.9	8.2	35.4	5.0	31.1	17.6	39	cosl
4-8	A2&B1	19.5	13.1	6.0	11.0	10.2	33.3	6.9	34.7	14.8	49	cosl
8-14	A2&B2	12.7	18.3	11.7	22.1	12.7	16.8	5.7	33.2	7.8	36	lcos
14-19	B3C	15.5	18.2	10.8	20.0	12.7	18.8	4.0	33.5	8.7	37	lcos
19-32	C1	13.6	18.5	11.8	21.2	12.4	18.6	3.9	32.2	9.5	38	lcos
32-42	C2	14.2	19.7	12.2	21.3	12.0	17.4	3.2	32.0	8.1	41	lcos

8C1a	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON	6B1a NITROGEN	C/N	6C1a Free Iron Fe2O3%		6E1c $CaCO_3$ equivalent		MOISTURE TENSIONS 4B1a 1/10 ATMOS.	4B1a 1/3 ATMOS.	4B2 15 ATMOS.
			%	%				%		%	%	%

Soil Type: *Tex sandy loam.
Date: Sept. 1959, by W. Goddard, J. S. Allen, L. Juve, C. J. Fox
Area: Gunnison County, Colorado
Location: SW¼ of NW¼ of Sec. 16, T. 13 S., R. 82 W. Southeast corner of photo 2717. North of Pleplant Cow Camp along Pleplant trail.
Parent Material: Granitic glacial morsine
Topography: Very hummocky. Slope gradient 35 percent.
Drainage: Well-drained
Vegetation: Lodgepole Pine. No understory except kinnikinick covering about 2 percent of ground surface
Use: National Forest Described by: Charles J. Fox.
Soil Nos. S-59-Colo-26-6

Lincoln Lab. No.	Horizon		
	A_{oo}	1-½ inch	Loose pine needles.
	A_o	½-0 inch	Decomposed pine needles.
	A_1	0-½ inch	Black (10YR 2/1 moist) sandy loam very high in charcoal from past fires; roots plentiful; lower boundary abrupt and smooth.
12016	A_2	½-4 inches	Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) gravelly sandy loam; weak very fine granular structure; soft when dry, very friable when moist, nonplastic when wet; clean sand grains; occasional rounded pebbles stained dark brown (7.5YR 4/4 dry) on under sides; approximate pH 6.0; roots plentiful; lower boundary clear and wavy.
12017	$A\&B_1$	4-8 inches	Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) when crushed gravelly sandy loam; removes in weak medium subangular blocky aggregates coated very pale brown (10YR 7/3 dry) and breaks to weak very fine granules; soft when dry, very friable when moist, nonplastic when wet; both clean and lightly stained sand grains; occasional rounded granitic gravels 2½ inches in diameter; approximate pH 6.0; roots plentiful; lower boundary clear and wavy.
12018	$A\&B_2$	8-14 inches	Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) gravelly loamy sand; weak medium subangular blocky structure breaking to weak very fine granules and single grains; sand grains lightly stained; soft when dry, very friable when moist, nonplastic when wet; approximate pH 6.0; approximately 30 percent of horizon is rounded

cobbles whose upper surfaces are coated with clean very fine sand grains forming a smooth surface. There are two wavy ¼ - inch bands in this horizon that are light brown (7.5YR 6/4 dry) to dark brown (7.5YR 4/4 moist) heavy clay loam breaking to moderate fine granular structure; extremely hard when dry, very firm when moist; very plastic

when wet; sand grains heavily stained; upper surfaces of bands thinly coated with very clean, very fine sand grains. Roots plentiful in this horizon; lower boundary gradual and wavy.

12019	B_3C	14-19 inches	Variegated brown (7.5YR 5/4 dry) to dark brown (7.5YR 4/4 moist) and yellowish brown (10YR 5/4 dry) gravelly loamy sand; crushed colors are pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist); compact in place and removes in hard angular fragments with upper surfaces coated with

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Trout Creek clay loam **LOCATION** Chaffee County, Colorado

SOIL NOS. S58Colo-8-1 **LAB. NOS.** 9044-9049

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<10mm)	TEXTURAL CLASS
0-2	A1	7.7a	4.1a	2.1a	5.1a	6.8a	43.4	30.8	26.3	26.9	16	cl
2-6	AB	4.0a	3.2a	1.6a	4.3a	6.7a	46.1	34.1	25.8	29.7	12	sicl
6-10	B2t	3.7b	3.0b	1.6b	3.7c	4.3c	36.8	46.9	17.6	25.7	20	c
10-16	B3ca	5.3d	4.1d	2.3d	4.7e	5.1e	32.1	46.4	16.3	23.5	16	c
16-22	Bca	9.0f	5.3f	2.2f	4.1g	4.4g	42.4	32.6	14.3	34.7	49	cl
22-25+	Cr	13.7f	8.1f	3.3f	6.0g	6.2g	38.2	24.5	18.7	29.1	58	l

8C1a pH 1:1	pH 1:5	pH 1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6C1a Free Iron Fe_2O_3 %	6E1a $CaCO_3$ equivalent %	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.6			4.04	0.235	17	2.8	<1			13.4
7.6			2.22	0.158	14	3.1	<1			13.2
7.7			1.52	0.093	16	3.4	<1			16.5
7.9			1.86	0.131	14	2.8	11			16.0
8.0			1.20	0.110	11	2.2	29			12.6
8.2			0.52	0.065	8	2.2	32			9.2

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg
←	milliequivalents per 100g. soil →							me/100g.		
28.5		2.1	1.6	<0.1	2.4					
27.8	27.6	1.7	2.4	<0.1	1.2	110	93	30.5	32.9	16.2
30.9	30.4	2.7	2.5	<0.1	1.1	111	93	34.2	36.7	11.2
25.7		2.9	<0.1	<0.1	0.8					
17.8		2.0	<0.1	<0.1	0.4					
12.9		1.8	<0.1	<0.1	0.3					

a. Few smooth dark brown concr. (Fe-Mn?)
b. Many smooth light brown to black concr. (Fe-Mn?)
c. Few smooth light brown to black concr. (Fe-Mn?)
d. Many smooth light brown to black concr. (Fe-Mn?) Also, few $CaCO_3$ concr.
e. Few smooth light brown to black concr. (Fe-Mn?) Also, few $CaCO_3$ concr.
f. Many smooth light brown to black concr. (Fe-Mn?) Also, common $CaCO_3$ concr.
g. Few smooth light brown to black concr. (Fe-Mn?) Also, common $CaCO_3$ concr.

Soil Type: Trout Creek clay loam **Described by:** A. J. Cline
Location: The SW¼ of Sec. 21, T13S, R77W. Chaffee County, Colorado.
Date of Sampling: September 1957. (Aerial photograph 2-105).
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline.
Physiographic Position: Side slope of high mountain valley at elevation of approximately 9,220 feet.
Topography: Moderately steep convex slope facing east.
Drainage: Well drained.
Vegetation: Scattered growth of spruce, poplar, and some Ponderosa pine with thick understory of grasses and sedges. **Use:** National Forest Service land.
Soil Nos.: S58Colo-8-1

Lincoln Horizon

Lab. No.			
9044	A	0-2	Brown (7.5YR 4/2 dry) to very dark gray (7.5YR 3/1 moist)

[redacted]

fine granular structure; noncalcareous; lower boundary clear and smooth.

9045	AB	2-6 inches	A partially mixed horizon with colors strongly variegated. Includes colors of (2.5YR 5/3 dry) (5YR 5/3 dry) (7.5YR 5/4 dry) and (10YR 4/2 dry) with moist colors of (10YR 4/3) (5YR 2/2) (7.5YR 3/4) 10YR 3/2. The crushed colors average approximately 5YR 3/3 moist; clay loam; slightly hard when dry, very friable when moist; strong; very fine granular structure; noncalcareous; approximately 5 percent of this horizon is channery and gravel; lower boundary clear and smooth.

9046 B[redacted] 6-10 [redacted]

SOIL SURVEY LABORATORY Lincoln, Nebr. February 1959

SOIL TYPE Trout Creek loam **LOCATION** Chaffee County, Colorado

SOIL NOS. S58Colo-8-11 **LAB. NOS.** 9091-9094

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-3	A1	4.6a	4.3a	2.9a	6.2a	6.2a	46.2	29.6	23.9	31.8	6	cl
3-6	AB	2.1a	2.2a	1.5a	3.7a	5.5a	53.0	32.0	23.6	37.0	11	sicl
6-12	B2t	1.7a	2.5a	1.8a	3.7a	4.9a	50.1	35.3	20.3	36.7	10	sicl
12-20	B3	0.4a	0.8a	0.6a	1.4a	1.5a	27.4	67.9	5.8	23.9	4	c

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Free Iron Fe_2O_3 6C1a		6E1a $CaCO_3$ equivalent %		MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.2			4.57	0.276	17	4.4		<1				13.4
7.4			2.76	0.183	15	4.5		<1				12.8
7.4			1.38	0.116	12	4.7		<1				12.7
7.2			1.28	0.110	12	4.4		<1				19.3

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	5C3 Base Sat. % on Sum Cations	Sum Bases 5B1a	Sum Cations 5A3a	Ca/Mg 8D3
←	milliequivalents per 100g. soil →							← me/100g →		
29.2	25.8	4.0	4.1	<0.1	2.4	110	89	32.2	36.3	6.4
28.0	26.4	4.3	3.7	<0.1	0.7	112	89	31.4	35.1	6.1
25.3	21.6	4.3	4.5	0.1	0.5	105	85	26.5	31.0	5.0
36.4	30.6	6.2	4.6	0.1	0.6	103	89	37.5	42.1	4.9

a. Common irregular brown concr. (Fe?) Also, few smooth black concr. (Mn?)

Soil Type: Trout Creek loam. **Described by:** A. J. Cline
Location: NW¼ of Sec. 21, T13S, R77W, Chaffee County, Colorado.
Date of Sampling: September 1957
Collectors: J. Retzer, E. M. Payne, R. Dansdill, A. J. Cline.
Physiographic Position: Mountain slope at an elevation of approximately 9,400 feet. Topography: Moderately steeply sloping but slightly concave area of approximately 12 percent gradient facing east. Drainage: Well drained.
Vegetation: Ring muhly, mountain fescue, June grass, mountain broom grass.
Use: National Forest Service lands.
Soil Nos.: S58Colo-8-11

Lincoln Lab. No.	Horizon		
9091	A_1	0-3 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) loam; soft when dry, very friable when moist; moderate to strong fine granular structure; noncalcareous; this horizon has a color of 7.5YR 3/2 when crushed; lower boundary clear and smooth.
9092	AB	3-6 inches	Brown (7.5YR 5/3 dry) to brown or dark brown (7.5YR 4/3 moist) loam; slightly hard when dry, very friable when moist; strong very fine subangular blocky structure; noncalcareous; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; lower boundary clear and smooth.
9093	B	6-12	Brown or reddish brown (6.75YR 5/4 dry) to reddish brown

[redacted]

friable when moist; strong fine subangular blocky structure noncalcareous; there are thin continuous clay skins on the surfaces of the soil aggregates; lower boundary abrupt and wavy.

9094	B_3	12-20 inches	Dark gray (2.5Y 4/1 dry) to very dark gray (2.5Y 3/1 moist) clay; very hard when dry, firm when moist; moderate medium prismatic structure breaking to moderate to strong medium angular blocks; noncalcareous; lower boundary gradual and wavy. There is some partially weathered shale chips in this horizon.

[redacted]

SOIL SURVEY LABORATORY Lincoln, Nebr. October 1963

SOIL TYPE Truckton coarse sandy loam **LOCATION** Elbert County, Colorado

SOIL NOS. S61Colo-20-1 **LAB. NOS.** 16628-16634

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002		

Soil Type: Truckton coarse sandy loam
Date Sampled: May 1961 Collectors: A. J. Cline and R. C. Accola
Area: Elbert County, Colorado
Location: 415 feet north and 425 feet east of the southwest corner of Sec. 2, T6S, R63W
Physiographic Position: Upland slope of approximately 5 percent facing southwest.
Drainage: Well drained
Vegetation: Yucca and blue grama grass
Use: Pasture land
Soil Nos.: S61-Colo-20-1 Described by: A. J. Cline.

Lincoln Lab. No. and Horizon			
16628	A11	0-2 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) coarse sandy loam; soft when dry, very friable when moist; weak fine platy structure breaking to moderate very fine granules; noncalcareous; lower boundary clear and smooth.
16629	A12	2-9 inches	Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) coarse sandy loam; hard when dry, very friable when moist; weak coarse and very coarse subangular blocky structure breaking to moderate fine granules; noncalcareous; lower boundary clear and smooth.
16630	B21t	9-13 inches	Brown (10YR 5/3 dry) to dark brown (10YR 3/3 moist) coarse sandy loam; very hard when dry, very friable when moist; weak coarse prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are a few thin patchy clay films on the surfaces of the soil [illegible] sand grains; lower boundary clear and smooth.
16631	B22t	13-19 inches	Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 moist) heavy coarse sandy loam; extremely hard when dry, friable when moist; moderate coarse prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are thin nearly continuous clay films on the surfaces of the soil aggregates and coatings and bridgings between sand grains; lower boundary clear and smooth.
16632	B3	19-25 inches	Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) coarse loamy sand; extremely hard when dry, friable when moist; very weak coarse prismatic structure breaking to weak medium subangular blocks; noncalcareous; there are a few thin patchy clay films and some coating and bridging between sand grains; lower boundary clear and smooth.
16633 & 16634	C	25-60 + inches	Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) coarse sand; hard when dry, very friable when moist; massive; noncalcareous; lower boundary clear and smooth.

SOIL SURVEY LABORATORY Lincoln, Nebr. January 1960 (Revised October 1963)

SOIL TYPE Truckton loamy sand **LOCATION** Morgan County, Colorado

SOIL NOS. S59Colo-44-7 / S59(61)Colo-44-7 **LAB. NOS.** 10872-10879 / 16635-16637a.

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-5	A11	1.3	5.9	9.2	45.4	19.0	12.9	6.3	56.2	3.4	Tr.	
5-11	A12	1.8	6.8	9.4	45.5	18.3	9.8	8.4	52.3	2.9	Tr.	
11-15	AB	1.9	8.6	11.9	45.6	11.3	6.0	14.7	40.2	2.0	Tr.	
15-20	B21t	0.9	5.8	10.7	47.7	12.6	6.4	15.9	43.2	2.0	Tr.	
20-26	B22t	0.6	4.5	9.6	45.1	13.4	9.8	17.0	44.8	4.0	Tr.	
26-32	B3	0.3	3.4	8.4	47.8	17.5	7.6	15.0	50.9	3.1	Tr.	
32-38	C1	0.3	2.9	10.3	62.9	13.3	2.2	8.1	50.6	0.9	Tr.	
38-60	C2	1.5	8.6	15.6	52.1	13.7	1.4	7.1	41.9	0.3	Tr.	

SATURATED PASTE	pH b. 1:1 8C1a	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Bulk Density a. 30 Cm. 4B3 % W.	4A1c g/cc	A. D. 4A1b g/cc	Water Retention 1/10 ATMS. Sieved %	1/3 ATMOS. Sieved %	4B2 15 ATMOS. Sieved %
	6.0		0.76	0.064	12	17.0	1.59	1.62			2.9
	6.6		0.46	0.049	9						3.3
	6.7		0.46	0.051	9						6.3
	6.9		0.39	0.043	9	16.3	1.67	1.74			6.5
	7.0		0.32	0.038	8	18.9	1.65	1.78			6.8
	7.0		0.19								6.0
	7.1		0.07								3.2
	7.2		0.05								2.4

Soil Type: Truckton loamy sand
Soil Nos.: S59Colo-44-7
Field classification: Chestnut-Brown Intergrade
Location: 360 feet west, 235 feet south of northeast corner, Sec. 34, T1N, R59W, Morgan County, Colorado.
Photo: YE-4F-166.
Climate: Continental, average annual precipitation 13-15 inches. Elevation 4,700 feet. Frost-free season 146 days. Mean annual temperature 48° F.
Vegetation: Grama, sandreed, sand bluestem, sand sage.
Parent material: Arkosic aeolian sands.
Physiographic position: Upland. Relief: Gently sloping, 1 to 2 percent slope.
Drainage: External slow, Internal rapid.
Moisture: Moist to 40 inches at time of sampling.
Water table: None encountered. Stoniness: None
Salt or alkali: None observed. Erosion: Slight wind.
Described by: Clayton F. Spears, May 6, 1959.

Horizon and Lincoln Lab. No.	
A11 10872	0 to 5 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist, 10YR 3/2.5 crushed) loamy sand; weak medium crumb breaking to weak fine crumb structure; soft when dry, very friable moist; noncalcareous; lower boundary clear and smooth.
A12 10873	5 to 11 inches. Brown (10YR 5/2.5 dry) to dark brown (10YR 3/2.5 moist and crushed) loamy sand; very weak coarse subangular blocky structure, breaking to weak medium crumbs; soft when dry, very friable when moist; noncalcareous; lower boundary clear and smooth.
AB 10874	11 to 15 inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3/3 moist and crushed) light sandy loam; weak coarse subangular blocky structure; slightly hard when dry, friable when moist; very thin patchy clay skins on vertical faces of soil aggregates; noncalcareous; lower boundary clear and smooth.
B21t 10875	15 to 20 inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3/3 moist, 10YR 3.5/3 crushed) sandy loam; weak coarse prismatic structure breaking to weak coarse subangular blocks; hard when dry, friable when moist; thin patchy clay skins on both vertical and horizontal faces of soil aggregates; noncalcareous; lower boundary clear and smooth.
B22t 10876	20 to 26 inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3.5/3 moist, 10YR 4/3 crushed) sandy loam; weak to moderate coarse prismatic structure breaking to weak to moderate coarse subangular blocks; very hard when dry, friable when moist; thin nearly continuous clay skins on both vertical and horizontal faces of soil aggregates; noncalcareous; lower boundary clear and wavy.
B3 10877	26 to 32 inches. Light yellowish brown (1.25Y 5.5/3 dry) to olive brown (1.25Y 4/3 moist, 1.25Y 4.5/3 crushed) heavy loamy sand; weak coarse subangular blocky structure; hard when dry, friable when moist; very thin patchy clay skins in root channels; noncalcareous; lower boundary clear and wavy.
C1 10878	32 to 38 inches. Light olive brown (2.5Y 5.5/4 dry) to olive brown (2.5Y 4.5/4 moist and crushed) sand; massive; slightly hard when dry, friable when moist; noncalcareous; lower boundary clear and smooth.
C2 10879	38 to 79 inches. 38 to 60 inches sampled. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/4 moist and crushed) fine sand and sand; massive; slightly hard when dry, friable when moist; noncalcareous; lower boundary diffuse and smooth.
C3	79 to 94 inches. Light yellowish brown (2.5Y 6/4 dry) to light olive brown (2.5Y 5/4 moist) loamy sand; massive; soft when dry, friable when moist; noncalcareous; lower boundary diffuse and smooth.
C4	94 to 108 inches. Light yellowish brown (2.5Y 6/4 dry) to olive brown (2.5Y 4.5/4 moist) noncalcareous sand.

Remarks: Associated soil Truckton loamy sand, 5 to 9 percent slopes.

Bureau of Public Road Samples: A12, 5-11 inches; B22, 20-26 inches; C2, 38-60 inches.

SOIL SURVEY LABORATORY Lincoln, Nebr. January 1960

SOIL TYPE Truckton loamy sand **LOCATION** Morgan County, Colorado

SOIL NOS. S59Colo-44-8 **LAB. NOS.** 10880-10886

DEPTH		1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1								2A2	TEXTURAL
		VERY				VERY					

Soil Type: Truckton loamy sand
Soil Nos.: 8590olc-44-8
Field classification: Chestnut-Brown Intergrade.
Location: 800 feet north, 800 feet east of the south quarter corner, Sec. 3, T1N, R59W, Morgan County, Colorado.
Photo: YE-4F-162.
Climate: Continental average annual precipitation 13-15 inches. Elevation 4,750 feet. Frost-free season 146 days.
Mean annual temperature 48° F.
Vegetation: Blue grama, sand bluestem, sand reed, sand sage.
Parent material: Arkosic aeolian sands.
Physiographic position: Upland.
Relief: Gently sloping 1-2 percent.
Aspect. Southwest-facing.
Drainage: Slow external, rapid internal.
Moisture: Moist to 40 inches at time of sampling.
Water table: None.
Stoniness: None.
Salt or alkali: None observed.
Erosion: Slight.
[redacted]

Horizon and
Lincoln
Lab. No.

A11
10880 0 to 7 inches. Grayish brown (10YR 4.5/2 dry) to very dark grayish brown (10YR 3/2 moist and crushed) loamy sand; weak medium crumb structure breaking to weak fine crumbs; soft when dry, very friable moist; noncalcareous; lower boundary clear and smooth.

A12
10881 7 to 17 inches. Grayish brown to dark grayish brown (10YR 4.5/2 dry) to dark brown (10YR 3/2.5 moist) (10YR 3.5/2 crushed) loamy sand; weak medium crumb structure breaking to weak fine crumbs; soft when
[redacted]

SOIL SURVEY LABORATORY Lincoln, Nebr. 3/18/58

SOIL TYPE Vasquez LOCATION Clear Creek County, Colorado

SOIL NOS. S55Colo-10-2 LAB. NOS. 2909-2913

DEPTH INCHES	HORIZON	1B1e PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	3A1 2A2 > 2 (<19mm)	TEXTURAL CLASS
0-1½	A11	10.6	8.0	3.8	5.2	3.0	37.8	31.6	18.2	25.4	3	cl
1½-4	A12	23.0	14.0	5.7	7.9	4.1	26.3	19.0	17.7	16.8	11	cosl
4-11	A3	36.4	14.4	4.6	6.1	3.7	18.5	16.3	14.6	10.9	18	cosl
11-21	C1	19.0	15.1	7.9	13.6	9.9	20.9	13.6	26.6	12.0	29	cosl
21-31+	C2	24.9	17.6	7.2	11.2	8.9	21.4	8.8	23.5	13.2	19	cosl

8C1a pH 1:1	8C1a pH 1:5	pH 1:10	6A1a ORGANIC MATTER ORGANIC CARBON %	6B1a NITROGEN %	C/N	6C1a Free Iron Fe_2O_3 %	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
	4.8		15.8	.971	16				37.6
4.6			5.94	.365	16	2.0			15.7
4.8			3.02	.238	13	2.2			11.5
4.9			0.56	.050	11	2.4			6.4
5.5			0.20	.015		1.8			3.0

5A1a CATION EXCHANGE	EXTRACTABLE CATIONS 6N2b	6O2b	6H1a	6P2a	6Q2a	5B1a BASE SAT. NH_4Ac %	Base Sat. % on Sum	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg

Soil Type: Vasquez loam
Soil Nos.: S55Colo-10-2
Location: The SW 1/4 of the NW 1/4, Sec. 22, T3S, R76W, Clear Creek County, Colorado, on the Jones Pass road about 1/2 mile above timberline.
Physiographic Position: Cirque basin.
Topography: Concave moderately steeply sloping area.
Drainage: Imperfect to poorly drained; water table fluctuating and moving.
Vegetation: Grasses, willows, tufted hairgrass.
Use: Grazing land.
Collected by: A. Aandahl, J. Retzer, H. Bindschadler, and E. M. Payne, August, 1955.

Horizon and Lincoln Lab. No.	
A11 2909	0 to 1½ inches. Dark gray (10YR 4/1 dry) to very dark brown (10YR 2/2 moist) loam; soft when dry, very friable when moist; weak to moderate coarse granular structure; extremely acid in reaction; lower boundary clear and smooth.
A12 2910	1½ to 4 inches. Gray (10YR 5/1 dry) to very dark grayish brown (10YR 3/2 moist) stony loam; soft when dry, very friable when moist; weak coarse granular structure; extremely acid in reaction; lower boundary clear and smooth.
A3 2911	4 to 11 inches. Grayish brown (10YR 5/2 dry) to dark brown (10YR 3/3 moist) stony sandy loam; slightly hard when dry, friable when moist; weak fine and medium subangular blocky structure breaking to weak coarse granules; extremely acid in reaction; approximately 15 percent of this horizon is stone; lower boundary abrupt but wavy.
C1 2912	11 to 21 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) cobbly sandy clay loam; slightly hard when dry, friable when moist; massive; extremely acid in reaction; a few medium-sized distinct 10YR 5/6 mottles; approximately 20 percent of this horizon is stone; lower boundary gradual and smooth.
C2 2913	21 to 31 inches plus. Very pale brown (10YR 7/4 dry) to light yellowish brown (10YR 6/4 moist) very fine sandy loam stratified with lenses of coarse sand; slightly hard when dry, very friable when moist; massive; extremely acid in reaction; horizon contains a few medium-sized distinct 10YR 5/4 mottles; approximately 50 percent of this horizon is rock and stone; ground water at the time of sampling occurred at 24 inches.

SOIL SURVEY LABORATORY Lincoln, Nebr. 6/26/58

SOIL TYPE Vasquez gravelly loam **LOCATION** Grand County, Colorado

SOIL NOS. **LAB. NOS.** 2806-2811

DEPTH INCHES	HORIZON	1B1a PARTICLE-SIZE DISTRIBUTION (in m.m.) (per cent)									3A1	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2	

Soil Type: Vasquez gravelly loam
Location: SW 1/4 of Sec. 26, T2S, R76W, Grand County, Colorado. Alpine meadow, East St. Louis Alpine Area.
Physiographic Position: Alpine basin.
Topography: Concave Alpine basin receiving drainage from higher lying Alpine areas.
Drainage: Poorly drained.
Vegetation: Tufted hairgrass, willows.
Use: National Forest Service lands.
Collected and Described by: John L. Retzer, September 6, 1952.

Horizon and Lincoln Lab. No.	
A11 2806	0 to 9 inches. Dark gray (10YR 4/1 dry) to black (10YR 2/1 moist) gravelly loam; soft when dry, very friable when moist; strong fine granular structure; strongly acid, approximate pH 5.1; lower boundary clear and smooth.
A12 2807	9 to 23 inches. Brown (10YR 5/3 dry) to dark brown (10YR 3/3 moist) gravelly loam; slightly hard when dry, very friable when moist; moderate fine subangular blocky structure breaking to moderate fine granules; extremely acid, approximate pH 4.3; lower boundary clear and smooth.
C1 2808	23 to 43 inches. Light yellowish brown (2.5Y 6/3 dry) to olive brown (2.5Y 4/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive or very weak subangular blocky structure; extremely acid, approximate pH 4.5; lower boundary clear and smooth.
C2 2809	43 to 48 inches. Light yellowish brown (2.5Y 6/4 dry) to light olive brown (2.5Y 5/4 moist) gravelly loamy sand; loose when dry or moist; single grained; very strongly acid, approximate pH 4.9; this horizon has many large prominent 10YR 5/6 mottles and bands making up approximately 50 percent of the ground mass; the soil temperature of this horizon on date of sampling was 37 degrees F., and it is thought that it represents the horizon of alternate freezing and thawing; lower boundary clear and smooth.
Cg 2810	48 to 84 inches. Pale olive (5Y 6/4 dry) to olive (5Y 5/4 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; very strongly acid, approximate pH 4.7; the horizon has many large prominent 10YR 5/2 and 2.5Y 5/8 mottles; the temperature of this horizon at date of sampling was approximately 32 degrees F., but the soil was not hard frozen on removal; lower boundary gradual and smooth.
D 2811	84 to 108 inches. Yellowish brown (10YR 5/4 dry) to dark yellowish brown (10YR 4/4 moist) gravelly sandy loam; this is a horizon of partially weathered schist rock with a gravelly sandy loam material between the individual rocks. Temperature of this horizon at the date of sampling was approximately 32 degrees F.

SOIL SURVEY LABORATORY Lincoln, Nebr. October 1963

SOIL TYPE Vona LOCATION Bent County, Colorado

sandy loam

SOIL NOS. S61Colo-6-1 LAB. NOS. 16639-16645

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-4	A1	5.6	22.9	13.1	17.0	9.6	18.8	8.0	31.6	4.2	Tr.	
4-7	A3	4.8	24.1	21.2	20.3	8.2	14.7	6.7	28.0	3.7	Tr.	
7-15	B21t	4.5	23.1	20.9	20.9	6.7	11.0	12.9	23.6	3.0	Tr.	
15-19	B22t	3.1	20.7	22.1	24.3	7.4	11.8	10.6	27.1	2.8	Tr.	
19-25	B3ca	2.7	19.6a	22.0a	25.1a	7.8a	12.3	10.5	28.1	3.3	Tr.	
25-34	Cca	5.9	23.5a	20.8a	20.8a	7.2a	10.7	11.1	23.5	3.4	Tr.	
34-50+	C	7.0	28.3a	20.4a	20.5a	6.6a	8.1	9.1	20.9	2.9	Tr.	

DEPTH INCHES	pH 8C1b SATURATED PASTE	pH 8C1a 1:1	pH 8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	ORGANIC MATTER 6B1a NITROGEN %	C/N	6C1a Ext. Iron as Fe %	Bulk Density 30 Cm. 4B3 % W.	Bulk Density 30 Cm. 4A1c g/cc	Bulk Density A.D. 4A1b g/cc	Water Retention 4B1b 1/10 ATMOS. Pieces %	Water Retention 4B1b 1/3 ATMOS. Pieces %	Water Retention 4B2 15 ATMOS. Sieved %
0-4	7.4	7.5	8.0	0.50	0.065	8	0.5	15.0	1.72	1.76			3.2
4-7	7.5	7.6	7.4	0.30	0.045	7	0.5						2.8
7-15	7.2	7.6	7.4	0.37	0.061	6	0.6	21.1	1.52	1.72	15.1	10.3	5.8
15-19	7.4	7.7	7.5	0.26	0.046	6	0.5						4.5
19-25	7.4	8.1	8.6	0.18	0.032		0.5						4.2
25-34	7.6	8.3	8.8	0.18			0.4						4.1
34-50+	7.7	8.1	9.0	0.02			0.4	15.6	1.72 b	1.83 c	9.1	7.0	3.0

DEPTH INCHES	5A1a CATION EXCHANGE CAPACITY NH_4OAc	EXTRACTABLE CATIONS 6N2b Ca	6G2b Mg	6H1a H	6P2a Na	6Q2a K	5B1a 5A3a Sum	8A1a Elec. Cond. EC x 10^3 mmhos	Sat. Ext. Sol. 8A1 6P1a Na	6Q1a K	8A Saturation Moist %	Carbonate as CaCO 6E1b <2-mm. %	6E1c Clay %
	← milliequivalents per 100g. soil →						→		<-me/liter->				
0-4	6.6	7.2	1.0	-	Tr.	0.7	8.9	0.73	0.1	1.3	20.0	-	
4-7	5.0	4.4	0.6	0.7	Tr.	0.5	6.2	0.46	0.1	0.9	17.9	-	
7-15	8.6	1.2	0.9	Tr.	Tr.	0.5	11.2	0.49	0.2	0.4	22.5	-	

Soil Type: Vona sandy loam
Date Sampled: November 1961 Collectors: A. J. Cline and R. C. Accola
Area: Bent County, Colorado
Location: 190' N &0.15 mile W of the SE Cor of Sec. 3, T21S, R51W
Physiographic position: Upland slope of approximately 4 percent facing southeast.
Drainage: Well drained
Vegetation: Grama grass, yucca, and cactus
Use: Pasture land.
Soil Nos.: S61-Colo-6-1 Described by: A. J. Cline.

Lincoln Lab. No. and Horizon			
16639	A1	0-4 inches	Pale brown (10YR 6/3 dry) to dark grayish brown (10YR 4/2 moist) light sandy loam; soft when dry, very friable when moist; moderate fine granular structure; noncalcareous; lower boundary clear and smooth.
16640	A3	4-7	Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 when moist; weak medium subangular blocky structure breaking to moderate medium granules; noncalcareous; lower boundary clear and smooth.
16641	B21t	7-15 inches	Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 moist) heavy sandy loam; slightly hard when dry, very friable when moist; weak very coarse prismatic structure breaking to moderate coarse subangular blocks; noncalcareous; there are a few thin patchy clay films on both the horizontal and vertical faces of the soil aggregates and bridges between sand grains; lower boundary gradual and smooth.
16642	B22 t	15-19 inches	Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) sandy loam; slightly hard when dry, very friable when moist; weak very coarse prismatic structure breaking to moderate very coarse subangular blocks; noncalcareous; there are thin patchy clay films on both the horizontal and vertical faces of the soil aggregates and there are clay bridges between sand grains; lower boundary clear and smooth.

SOIL SURVEY LABORATORY Lincoln, Nebr. October 1963

SOIL TYPE Vona sandy loam **LOCATION** Morgan County, Colorado

SOIL NOS. S61Colo-44-1 **LAB. NOS.** 16646-16651

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 1B1a VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-2	A1	0.3	7.9	14.6	28.3	29.3	11.7	7.9	55.4	2.9	-	
2-4	A3	0.4	7.9	14.4	28.3	28.8	9.3	10.9	52.9	2.4	-	
4-10	B2t	0.4	7.8	14.8	28.5	24.9	5.6	18.0	45.4	2.0	-	
10-15	B3	0.4	6.1	11.8	31.8	32.0	4.9	13.0	56.1	1.8	Tr.	
15-31	Cca1	0.1	3.3a	7.0a	25.3a	41.6a	8.7	13.5	66.5	2.4	-	
31-60	Cca2	0.2	3.0a	6.7a	33.9a	40.7a	4.6	10.9	68.8	1.7	Tr.	

SATURATED PASTE 8C1a	pH 1:1	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Bulk Density 30 Cm. 4B3 % W.	4A1c g/cc	A.D. 4A1b g/cc	Water Retention 4B1b 1/10 ATMOS. Pieces %	4B1b 1/3 ATMOS. Pieces %	4B2 15 ATMOS. Sieved %
	7.1		0.74	0.066	11	16.8	1.60b	1.64b	15.4	7.6	3.5
	6.9		0.57	0.060	10						3.9
	6.7		0.55	0.083	7	23.6	1.44	1.60	22.0	15.5	6.5
	7.3		0.31	0.049	6						5.8
	8.0		0.22	0.030					19.1	9.4	5.5
	8.3		0.02								4.2

5A1a CATION EXCHANGE CAPACITY NH_4OAc	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	5A3a Sum	8D3 Ca/Mg	8H1 NH_4Ac CEC to Clay Ratio	Carbonate as $CaCO_3$ 6E1b <2-mm. %	6E1c Clay %
←	milliequivalents per 100g. soil					→				
6.7	5.2	1.4	0.8	Tr.	0.8	8.2	3.7	.85	-	
7.9	5.8	1.5	1.0	Tr.	0.8	9.1	3.9	.72	-	
14.0	10.5	2.9	1.4	Tr.	0.9	15.7	3.6	.78	-	
11.1	9.9	2.5	0.5	Tr.	0.5	13.4	4.0	.85	-	
8.9				Tr.	0.5			.66	4	Tr.
7.5				0.3	0.6			.69	2	-

a. Trace carbonate nodules.
b. One clod.

Soil Type: Vona sandy loam
Date Sampled: April 1961 **Collectors:** A. J. Cline and R. C. Accola
Area: Morgan County, Colorado
Location: 1,700 feet south and 1,000 feet east of the northwest corner of Sec. 22, T5N, R59W
Physiographic Position: Upland slope of 3 to 4 percent facing southeast
Drainage: Well drained..
Vegetation: Blue grama grass, cactus, and yucca.
Use: Pasture land
Soil Nos.: S61-Colo-44-1 **Described by:** A. J. Cline.

Lincoln Lab. No. and Horizon			
16646	A1	0-2 inches	Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) loamy sand; soft when dry, very friable when moist; moderate very fine granular structure; noncalcareous; lower boundary abrupt and smooth.
16647	A3	2-4 inches	Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 moist) fine sandy loam; slightly hard when dry, very friable when moist; weak to moderate fine granules; noncalcareous; lower boundary clear and smooth.
16648	B2t	4-10 inches	Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 moist) heavy fine sandy loam; hard when dry, very friable when moist; weak to moderate coarse prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are many thin patchy clay films on both the horizontal and vertical faces of the soil aggregates and there are gray coatings and bridgings between sand grains; lower boundary clear and smooth.
16649	B3	10-15 inches	Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) fine sandy loam; slightly hard when dry, very friable when moist; weak coarse prismatic structure breaking to weak to moderate medium subangular blocks; noncalcareous; there are a few thin patchy clay films principally on the vertical faces of the soil aggregates and there is some coating and bridging between sand grains; lower boundary gradual and smooth.
16650	Cca1	15-31 inches	Pale brown (slightly lighter than 10YR 6/3 dry) to brown (slightly lighter than 10YR 5/3 moist) light fine sandy loam; soft when dry, very friable when moist; massive or very weak coarse subangular blocky structure; calcareous; this is a weak Ca horizon with some visible calcium carbonate occurring as concretions and as thin seams and streaks; lower boundary gradual and wavy.
16651	Cca2	31-60 inches	Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) loamy fine sand; soft when dry, very friable when moist; massive or single grained; calcareous; there is a small amount of accumulated calcium carbonate in this horizon but less than in the horizon above.

SCS-420
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Weld silt loam SOIL Nos. 861Colo-3-3 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 15500-15507 February 1965

Depth (In.)	Horizon	Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Clay: Carbonate	3A1a Clay: Noncarbonate	Coarse fragments 2A2: > 2	Coarse fragments 2A2: 2 – 19	Coarse fragments 2A2: 19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0-3	A1	21.6	61.8	16.6	0.2a	0.4a	0.4	2.8	17.8	42.2	19.6	62.1	3.8		17	Tr.		
3-6	B1	19.1	52.0	28.9	0.1a	0.2a	0.2	2.3	16.3	35.3	16.7	53.4	2.8		29	Tr.		
6-12	B2t	12.5	46.7	40.8	-	0.1a	0.1	1.2	11.1	29.5	17.2	41.4	1.4	-	41	Tr.		
12-15	B2ca	12.1	53.9	34.0	-	0.1b	0.1b	1.2c	10.7c	30.3	23.6	41.9	1.4	4	30	Tr.		
15-22	B31ca	12.0	55.4	32.6	-	0.1b	0.1b	1.1c	10.7c	31.0	24.4	42.5	1.3	7	26	Tr.		
22-32	B32ca	11.3	58.5	30.2	0.1b	0.1b	0.1b	1.0c	10.0c	32.4	26.1	43.1	1.3	8	25	-		
32-48	C1ca	12.7	62.5	24.8	-	0.1b	0.1b	0.8c	11.7c	35.2	27.3	47.5	1.0	3	22	-		
48-63	C2	13.5	62.4	24.1	-	0.1b	0.2b	0.9c	12.3c	38.0	24.4	50.9	1.2	1	23	Tr.		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6E1c Carbonate as $CaCO_3$	6C1a Ext. Iron as Fe	Bulk density: 4A1c 30-Cm.	Bulk density: 4A1b Air-dry	4D1 COLE d	Water content: 4B3 30-Cm.	Water content: 4B1b 1/3-Bar	Water content: 4B2 15-Bar	4C1 1/3- to 15-Bar Wtr. per horizon	8D1 15-Bar Water to Clay Ratio	pH: 8C1b Sat. Paste	pH: 8C1a 1:10	pH: 8C1a (1:1)
	Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.					
0-3	1.73	0.126	14		0.8			1.36		16.9	7.8		0.47	6.3	6.7	6.3
3-6	1.33	0.133	10	-	0.8					20.3	11.5		0.40	6.2	6.5	6.3
6-12	1.16	0.112	10	Tr.	0.2	1.26	1.42	0.23	20.4	28.0	16.6	0.8	0.40	7.0	7.6	7.5
12-15	0.93	0.097	10	10	0.6					23.8	14.2		0.42	7.4	8.2	7.8
15-22	0.59	0.066	9	14	0.5		1.51			25.8	13.1		0.40	7.8	8.7	8.2
22-32	0.34	0.040	8	12	0.6		1.46			27.5	12.7		0.42	8.0	9.0	8.4
32-48	0.22			9	0.6		1.38			27.6	11.6		0.47	7.9	9.1	8.4
48-63	0.17			7	0.6		1.32			25.9	11.5		0.48	7.9	9.1	8.3

Depth (In.)	Extractable bases 5B1a: 6N2b Ca	6N2b Mg	6P2a Na	6Q2a K	Sum	6H1a Ext. Acidity	5A3a Sum Cations	5A1a NH_4OAc	5A2a NaOAc
	meq/100 g								
0-3	8.6	2.7	Tr.	1.2	12.5	3.5	16.0	13.7	14.5
3-6	13.8	4.5	0.1	1.0	19.4	3.6	23.0	20.3	21.4
6-12			0.2	1.3				29.7	30.8
12-15			0.4	1.0				23.7	26.2
15-22			1.2	1.0				21.3	22.8
22-32			3.0	1.0				21.4	22.8
32-48			5.0	1.1				21.5	22.2
48-63			6.3	1.0				21.4	22.7

Depth (In.)	Water extract from saturated paste 8A1: 6M1a Ca	6O1a Mg	6P1a Na	6Q1a K	6T1a CO_3	6M1a HCO_3	6N1e Cl	6L1a SO_4	8A1a Electrical conductivity
	meq/liter								mmho/cm
0-3			0.2	0.7					0.36
3-6			0.4	0.3					0.25
6-12			0.8	0.4					0.63
12-15			1.6	0.4					0.81
15-22	1.4	0.8	3.8	0.3	-	6.6	-	0.6	0.66
22-32	0.5	0.4	7.7	0.2	-	9.6	3.2	0.3	1.09
32-48	2.3	2.0	24.6	0.4	-	6.8	21.6	5.7	3.28
48-63	5.8	4.5	41.0	0.5	-	4.0	34.5	18.5	5.50

Depth (In.)	8A Water at Saturation Pct.	5D1 Exchangeable Na $NaOAc$ CEC Pct.	5E Sodium Adsorption Ratio	6F1a Gypsum Pct.	8D1 NH_4OAc CEC to Clay Ratio	Base Sat. 5C3 Sum Cations	Base Sat. 5C1 NH_4OAc
0-3	38.0				0.82	78	91
3-6	44.0				0.79	84	96
6-12	56.4	1			0.73		
12-15	49.9	1			0.70		
15-22	47.2	4	4		0.65		
22-32	46.2	11	11	-	0.71		
32-48	45.3	18	17	-	0.87		
48-63	42.4	20	18	-	0.89		

a. > 50% organic matter.
b. 25-50% mica.
c. 5-25% carbonate.
d. Coefficient of linear extensibility.

Sand Mineralogy (Method 7B1). Weld has an increase in mica with depth.

Soil Type: Weld silt loam
Soil Nos.: S61Colo-3-3
Classification: Brown.
Location: 3,400 feet east, 328 feet north of the southwest corner of Sec. 23, T5S, R59W, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation 14 inches. Mean annual temperature 49° F.
Frost-free period 150 days. Elevation 5,400 feet.
Vegetation: Native pasture. Blue grama, sixweeks fescue, pricklypear, some buffalograss and western wheatgrass.
Parent material: Aeolian silty material. Loess.
Physiographic position: Upland.
Relief: Nearly level, 1 to 2 percent slope facing east.
Drainage: Well drained, surface and internal. Intake rate is moderate.
Moisture: Slightly moist to 20 inches. Usually dry.
Water table: None. Stoniness: None.
Salt or alkali: Typical for B3ca to have a pH over 8.5, but no visible salts other than calcium carbonate.
Erosion: Slight water erosion. Moderate wind erosion on west and north-facing slopes and crest of ridges.
Described by: J. B. Brown, June 27, 1961.

Horizon and Lincoln Lab. Nos.	
A1 15500	0 to 3 inches. Very dark grayish brown (10YR 3.5/2, moist) silt loam; grayish brown (10YR 5.5/2, dry) weak medium subangular blocks breaking to moderate fine granules; soft when dry, very friable when moist; many roots; field pH 6.8; clear smooth boundary.
B1 15501	3 to 6 inches. Dark brown (10YR 3.5/3, moist) heavy silt loam; brown (10YR 5/3, dry) weak to moderate medium prisms breaking to weak to moderate subangular blocks; slightly hard when dry, very friable when moist; many roots with thin patchy clay films along channels, and on lower part of ped surfaces; field pH 6.8; clear smooth boundary.
B2t 15502	6 to 12 inches. Dark brown (10YR 3.5/3, moist) silty clay loam; brown (10YR 4.5/3, dry) brown (10YR 4.3, moist and crushed) moderate fine prisms breaking to strong fine and very fine angular blocks; hard when dry, firm when moist; thin nearly continuous clay films on peds; top ½ inch of B2 has no macro structure, but the fine and very fine angular blocks are distinctive; many roots and root channels, with roots penetrating peds; field pH 7.0; abrupt slightly wavy boundary.
B2ca 15503	12 to 15 inches. Brown (10YR 5/3, moist) silty clay loam; brown (10YR 5.5/3, dry) moderate fine and medium prisms breaking to strong fine angular and subangular blocks; hard when dry, friable when moist; thin patchy clay film on all peds, with dark stains on ped surfaces; many roots and root channels penetrating peds; violent effervescence, with field pH 8.4; clear smooth boundary.
B31ca 15504	15 to 22 inches. Light olive brown (1Y 5.5/3, moist) light silty clay loam; light yellowish brown (1Y 6.5/3, dry) moderate medium prisms breaking to moderate medium angular and subangular blocks; hard when dry, friable when moist; lime concretions are few medium and faint; this horizon contains some roots and many holes less than one millimeter in diameter; thin clay films on vertical ped surfaces; violent effervescence, with field pH of 9.0; gradual smooth boundary.
B32ca 15505	22 to 32 inches. Light olive brown (1Y 5.5/3, moist) heavy silt loam; light yellowish brown (1Y 6.5/3, dry) weak to moderate medium prisms breaking to weak to moderate medium subangular blocks; slightly hard when dry, friable when moist; few roots but many pores less than one millimeter in diameter; many fine thin

SCS-420
10-64

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Weld silt loam SOIL Nos. S61Colo-3-7 LOCATION Arapahoe County, Colorado

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 15533-15540 February 1965

Depth (In.)	Horizon	1B1a Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Clay: Carbonate	3A1a Clay: Noncarbonate	Coarse fragments 2A2: > 2	Coarse fragments 2A2: 2 – 19	Coarse fragments 2A2: 19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0-3	A1	27.1	58.8	14.1	0.2a	0.5a	0.7a	4.0	21.7	40.3	18.5	64.8	5.4		14	Tr.		
3-6	B1	21.0	53.2	25.8	0.1a	0.2a	0.4	2.9	17.4	35.1	18.1	54.5	3.6		26	Tr.		
6-12	B2t	14.8	45.4	39.8	0.1a	0.1a	0.2	1.2	13.2	29.0	16.4	43.1	1.6	-	40	-		
12-21	B31ca	15.3	54.0	30.7	-	-	0.1b	1.0c	14.2c	31.0	23.0	46.0	1.1	6	25	-		
21-31	B32ca	14.3	57.6	28.1	-	-	0.1b	0.9d	13.3d	32.7	24.9	46.7	1.0	3	25	-		
31-43	C1ca	14.5	61.1	24.4	-	0.1b	0.1b	1.1d	13.2d	35.1	26.0	49.1	1.3	2	22	-		
43-56	C2	16.0	62.9	21.1	-	0.1b	0.1b	1.1d	14.7d	37.1	25.8	52.6	1.3	1	20	-		
56-68	C3	17.1	63.7	19.2	-	0.1b	0.1b	1.0d	15.9d	38.9	24.8	55.5	1.2	Tr.	19	-		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N		6E1c Carbonate as $CaCO_3$		Bulk density: 4A1c 30-Cm.	Bulk density: 4A1b Air-Dry	4A11 COLE e	Water content: 4B3 30-Cm.		Water content: 4B2 15-Bar		8D1 15-Bar Water to Clay Ratio	pH: 8C1b Sat. Paste	pH: 8C1a 1:10	pH: 8C1a (1:1)
	Pct.	Pct.			Pct.		g/cc	g/cc	g/cc	Pct.	Pct.	Pct.					
0-3	1.58	0.124	13		-							7.3		0.52	6.9	7.2	6.9
3-6	1.13	0.113	10		-			1.30	1.41	0.08	27.1	9.7		0.38	6.4	6.8	6.6
6-12	1.10	0.114	10		2							16.6		0.42	7.0	8.0	7.5
12-21	0.72	0.074	10		14				1.44			12.9		0.42	7.6	8.5	8.0
21-31	0.42	0.046	9		11							12.5		0.44	7.7	8.7	8.2
31-43	0.24				9				1.39			11.9		0.49	7.9	8.9	8.4
43-56	0.17				7							11.2		0.53	7.9	9.0	8.4
56-68	0.12				6				1.41			10.8		0.56	7.9	8.9	8.3

Depth (In.)	Extractable bases 6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	Sum	6H1a Ext. Acidity	Cat. Exch. Cap. 5A3a Sum Cations	5A1a NH_4OAc	5A2e NaOAc	Water extract from saturated paste 8A1: 6P1a Na	6Q1a K	CO_3	HCO_3	Cl	SO_4	8A1a Electrical conductivity
	meq/100 g									meq/liter						mmho/cm
0-3	8.6	2.8	Tr.	1.7	13.1	2.3	15.4	13.1	13.5	0.2	1.3					0.44
3-6	12.6	4.0	Tr.	0.9	17.5	3.0	20.5	18.0	18.2	0.3	0.3					0.37
6-12			0.1	1.4				29.2	29.6	0.6	0.5					0.72
12-21			0.3	0.9				20.3	21.6	1.3	0.4					0.51
21-31			1.0	1.1				20.8	21.6	3.4	0.4					0.60
31-43			2.1	1.3				21.0	21.6	7.5	0.5					1.16
43-56			2.9	1.3				21.0	21.4	13.4	0.5					2.00
56-68			3.4	1.1				20.7	21.2	18.9	0.5					2.80

Depth (In.)	8A Water at Saturation	5D1 Exchangeable Na $NaOAc$ CEC	6F1a Gypsum	8D1 NH_4OAc CEC to Clay Ratio	Base Sat. 5C3 Sum Cations	Base Sat. 5C1 NH_4OAc
	Pct.	Pct.	Pct.			
0-3	40.1			0.93	85	100
3-6	39.1			0.70	85	97
6-12	55.9			0.73		
12-21	45.9	1		0.66		
21-31	43.0	4		0.74		
31-43	42.1	8	-	0.86		
43-56	39.3	11	-	1.00		
56-68	37.8	13	-	1.08		

a. > 50% organic matter.
b. 25-50% mica-like.
c. 5-25% carbonate.
d. 5-25% carbonate. < 5% mica-like.
e. Coefficient of linear extensibility.

Soil Type: Weld silt loam
Soil Nos.: S61Colo-3-7
Classification: Brown.
Location: 2,162 feet south, 184 feet east of northwest corner, Sec. 16, T4S, R59W, Arapahoe County, Colorado.
Climate: Continental, average annual precipitation 14 inches. Mean annual temperature 49° F.
Frost-free period 150 days. Elevation 5,100 feet.
Vegetation: Native pasture. Blue grama, sixweeks fescue, pricklypear. Some buffalograss and western wheatgrass.
Parent material: Aeolian silty material - Loess.
Physiographic position: Upland.
Relief: Nearly level, 2 percent slope facing east.
Drainage: Well drained, surface and internal. Intake rate is moderate.
Moisture: Slightly moist to 18 inches, usually dry.
Water table: None. Stoniness: None.
Salt or alkali: Typical for B3ca to have a pH over 8.5, but no visible salts other than calcium carbonate.
Erosion: Slight water erosion. Moderate wind erosion on west and north-facing slopes and crests of ridges.
Described by: J. B. Brown, June 28, 1961.

Horizon and Lincoln Lab. No.

A1 15533 — 0 to 3 inches. Very dark grayish brown (10YR 3.5/2, moist) silt loam; grayish brown (10YR 5/2, dry) weak medium subangular blocks breaking to moderate fine granules; soft when dry, very friable when moist; field pH of 6.8; clear smooth boundary.

B1 15534 — 3 to 6 inches. Very dark grayish brown (10YR 3.5/2, moist) silt loam; grayish brown (10YR 4.5/2, dry) moderate medium prisms breaking to moderate medium subangular blocks; slightly hard when dry, very friable when moist; many roots with thin patchy clay films in channels, and on lower part of ped surfaces; field pH 6.8; clear smooth boundary.

B2t 15535 — 6 to 12 inches. Very dark grayish brown (10YR 3.5/2, moist) silty clay loam; dark grayish brown (10YR 4/2, dry) dark brown (10YR 4/3, moist and crushed) moderate fine prisms breaking to strong fine and very fine angular blocks; hard when dry, firm when moist; thin nearly continuous clay film on all peds; top ½ inch of B2 horizon does not have prismatic structure, but the strong grade of very fine angular blocks; [illegible]

[redacted]

slightly wavy boundary.

B31ca 15536 — 12 to 21 inches. Grayish brown (1Y 5/2, moist) light silty clay loam; light brownish gray (1Y 6/2, dry) moderate medium prisms breaking to moderate medium fine angular and subangular blocks; hard when dry, friable when moist; thin patchy clay skins on peds; many roots and root holes, with many fine pores less than one millimeter in diameter; lime concretions are common medium and faint; violent effervescence, with a field pH of 8.6; gradual smooth boundary.

B32ca [illegible] — 21 to 31 inches. Gray brown (1Y 5/2, moist) heavy silt loam; light brownish gray (1Y 6/2, dry) weak [redacted]

when moist; some roots with thin very patchy clay films in channels, and some ped surfaces; many fine pores one millimeter in diameter; few fine faint lime concretions; violent effervescence, with a field

SOIL SURVEY LABORATORY NANDAN, NORTH DAKOT. 9-7-55

SOIL TYPE Weld silt loam **LOCATION** KIT CARSON CO., COLO.

SOIL NOS. S-54-Colo-32-1 **LAB. NOS.** 2554-2561

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 1B1a: VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1: 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-1½	A11	0.2 a	0.6	0.6	2.1	24.3	52.2	20.0	61.6	16.2	-	sil
1½-3	A12	0.1 a	0.7	0.5	0.9	23.5	54.5	19.8	58.0	20.6	-	sil
3-5	A_2B1	0.1	0.9	0.7	1.1	25.3	53.3	18.6	60.9	13.4	-	sil
5-11	B21	0.2	0.5	0.5	0.6	25.4	47.4	25.4	58.8	14.4	-	1
11-17	B3ca1	-	0.5	0.5	1.5	26.1	44.4	27.0	56.0	15.5	-	1/cl
17-23	B3ca2	-	0.5	0.3	1.2	28.4	43.1	26.5	55.5	16.6	-	1
23-33	Cca1	-	0.3	0.2	0.5	26.3	49.8	22.9	58.6	17.8	-	1
33-45	Cca2	-	0.1	0.2	0.8	28.1	51.8	19.0	61.9	18.5	-	sil

pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	ORGANIC MATTER 6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM @25°C.	6E1a $CaCO_3$ equiv. %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.1	7.7	7.9	2.26	.185	12	-		-				10.5
6.8	7.3	7.4	2.20	.176	12	-		-				11.3
6.4	7.0	7.1	1.33	.117	11	-		1				9.4
7.4	8.3	8.5	1.06	.112	10	-		2				12.0
7.8	8.7	8.9	0.82	.092	9	-		7				13.3
7.9	8.8	9.0	0.65	.071	9	-		11				13.3
7.9	8.9	9.1	0.38			-		11				11.8
7.9	8.9	9.0	0.23			-		9				10.6

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	H	6P2a Na	5B1a 6Q2a K	BASE SAT. % 5D1	8D3 Ca/Mg	MOISTURE AT SATURATION %
	milliequivalents per 100g. soil →							
21.2	18.2	3.2		0.1	2.1		5.7	
22.1	15.9	2.8		0.1	2.0	94	5.7	
18.1	12.8	2.3		0.1	1.2	91	5.6	
22.5		3.5		0.1	0.7			
21.6				0.2	1.0			
20.7				0.2	1.1			
20.1				0.2	1.6			
19.8				0.2	2.1			

a Organic Matter in Sand Fractions

Soil Type: Weld silt loam
Soil Nos.: 854Colo-32-1
Location: 100 feet east, and 25 feet west of southwest corner Sec. 13, T10S, R43W, Kit Carson County, Colorado.
Physiographic Position: Upland.
Topography: A very gentle convex slope of approximately 2 percent facing northeast.
Drainage: Well drained.
Vegetation: Chiefly blue grama, western wheat and buffalograss.
Use: Pasture.
Sampled by: James Allen, E. M. Payne, Dale Romine, A. J. Cline, September 2, 1954.
Described by: E. M. Payne.

Horizon and Lincoln Lab. Number

A11 2554 — 0 to 1½ inches. Grayish brown (10YR 5/2.5 dry) to very dark grayish brown (10YR 3/2 moist) silt loam; soft when dry, very friable when moist; moderate fine platy, breaking to moderate fine crumb structure; noncalcareous; lower boundary clear and smooth.

A12 2555 — 1½ to 3 inches. Gray (10YR 5/1 dry) to very dark gray (10YR 3/1 moist) silt loam; slightly hard (dry), very friable (moist); weak very coarse platy, breaking to moderate coarse granular; noncalcareous; lower boundary clear and smooth.

A2B1 2556 — 3 to 5 inches. Pale brown (10YR 6/2.5 dry) to dark grayish brown (10YR 3.5/2 moist) silt loam; hard (dry), friable (moist); weak coarse subangular blocky structure; noncalcareous; lower boundary abrupt and smooth; there is some gray flecking on the sides of the aggregates in this horizon.

B21 2557 — 5 to 11 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) light silty clay loam; hard (dry), friable (moist); strong medium prismatic; breaking to strong medium angular blocky; noncalcareous; a few thin but distinct Tonhautchen; lower boundary is abrupt and smooth.

B3ca1 — 11 to 17 inches. Light gray (10YR 7/2 dry) to grayish brown (10YR 5/2.5 moist) light silty clay loam;

[redacted]

calcareous; the horizon contains a few small lime mycelia; the lower boundary is gradual and smooth.

B3ca2 2559 — 17 to 23 inches. Very pale brown (10YR 7/3 dry) to pale brown (10YR 6/3 moist) silt loam; hard (dry), friable (moist); weak coarse prismatic to weak coarse subangular blocky; calcareous; the horizon contains slight to moderate amounts of accumulated lime chiefly as lime flour but segregated into a few lime mycelia; lower boundary gradual and smooth.

Cca1 2560 — 23 to 33 inches. Very pale brown (10YR 8/3 dry) to pale brown (10YR 6/3 moist) silt loam; hard (dry), very friable (moist); massive; calcareous; the horizon contains moderate amounts of accumulated lime chiefly as lime flour; lower boundary is gradual and smooth.

[redacted]

Cca2 2561 — 33 to 45 inches. Very pale brown (10YR 8/3 dry) to pale brown (10YR 6/3 moist) silt loam; slightly hard (dry), very friable (moist); massive; calcareous; the horizon contains moderate amounts of accumulated lime chiefly as lime flour.

SOIL SURVEY LABORATORY MANDAN, NORTH DAKOTA 9-7-55

SOIL TYPE Weld silt loam **LOCATION** KIT CARSON CO., COLO.

SOIL NOS. S-54-Colo-32-2 **LAB. NOS.** 2562-2569

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (In mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-2½	A1	0.3[a]	0.9	0.9	2.0	35.6	39.2	21.1	63.5	12.6	-	l
2½-5	A2	-	1.0	0.7	1.8	31.1	49.7	15.7	65.8	16.2	-	l
5-9½	B21	-	0.5	0.4	1.0	19.9	37.2	41.0	45.5	12.3	-	c
9½-14	B22	-	0.5	0.4	1.0	21.9	36.6	39.6	47.2	12.0	-	cl
14-18	B3ca1	-	0.1	0.1	1.1	31.1	40.1	27.5	56.9	15.2	-	cl
18-25	B3ca2	-	0.1	0.1	0.6	30.9	49.0	19.3	61.0	19.4	-	l
25-33	Cca1	-	0.1	0.1	0.5	37.1	46.2	16.0	67.8	15.9	-	l
33-43	Cca2	-	0.9	0.6	0.8	45.2	36.9	15.6	71.6	11.1	-	l

pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	ORGANIC MATTER 6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM @25°C.	6K1a $CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.9	7.5	7.6	1.22	.128	10	-		-				9.7
6.7	7.5	7.6	1.13	.096	12	-		-				7.1
6.3	7.2	7.3	1.11	.098	11	-		-				16.8
7.3	8.2	8.4	0.77	.097	8	-		-				17.1
8.0	9.1	9.2	0.57	.048	12	-		8				13.4
8.2	9.3	9.5	0.32	.036	9	-		12				11.4
8.2	9.3	9.5	0.18			-		10				9.5
8.1	9.3	9.5	0.12					7				7.8

5A1a CATION EXCHANGE CAPACITY	EXTRACTABLE CATIONS 6H2b Ca	6G2b Mg	N	6P2a Na	6Q2a K	5B1a BASE SAT. % 5D1	8D3 Ca/Mg	MOISTURE AT SATURATION %
← NH4Ac	milliequivalents per 100g. soil →							
19.2	13.9	4.0		0.1	2.0		3.5	
13.8	9.2	2.8		0.1	1.4	98	3.3	
29.2	17.9	7.4		0.2	2.1	94	2.4	
30.1	19.3	9.2		0.6	2.2		2.1	
22.3				0.7	1.9			
19.0				1.2	2.0			
21.0				1.6	2.0			
15.3				1.8	1.8			

a Organic Matter in Sand Fractions

Soil Type: Weld silt loam
Soil Nos.: S54Colo-32-2
Location: 1/4 mile west, 125 feet south of northeast corner of Sec. 32, T8S, R46W, Kit Carson County, Colorado.
Physiographic Position: Upland.
Topography: Gentle convex slope of approximately 2 percent facing east.
Drainage: Well drained.
Vegetation: Predominantly blue grama with some buffalo, western wheat, threadgrass.
Use: Pasture.
Sampled by: James Allen, Dale Romine, E. M. Payne, and A. J. Cline, September 1, 1954.
Described by: E. M. Payne.

Horizon and Lincoln Lab. Number	
A1 2562	0 to 2½ inches. Grayish brown (10YR 5/2.5 dry) to dark grayish brown (10YR 4/2 moist) silt loam; soft (dry), very friable (moist); moderate coarse platy, breaking to moderate coarse crumb structure; noncalcareous; lower boundary clear and smooth.
A2 2563	2½ to 5 inches. Light brownish gray (10YR 6/2.5 dry) to dark grayish brown (10YR 3.5/2 moist) silt loam; slightly hard (dry), very friable (moist); weak coarse columnar, breaking to weak medium subangular blocky; noncalcareous; tops of the columns are slightly rounded and have an indistinct platy structure that is confined to the top 1/4 to 1/2 inch; lower boundary abrupt and smooth.
B21 2564	5 to 9½ inches. Brown (10YR 4.5/3 dry) to dark brown (10YR 3.5/3 moist) heavy silty clay loam; very hard (dry), firm (moist); strong fine prismatic structure, breaking to strong fine angular blocky; noncalcareous; moderately thick distinct Tonhautchen; lower boundary clear and smooth.
B22 2565	9½ to 14 inches. Dark grayish brown (10YR 4/2 dry) to very dark grayish brown (10YR 3/2 moist) heavy silty clay loam; very hard (dry), firm (moist); strong medium prismatic, breaking to strong medium angular blocky; noncalcareous; moderatley thick distinct Tonhautchen; lower boundary abrupt and smooth.
B3ca1 2566	14 to 18 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist); light silty clay loam; very hard (dry), firm (moist); moderate coarse prismatic, breaking to moderate coarse angular blocky; calcareous; the horizon contains a few small calcium carbonate concretions and mycelia; Tonhautchen are faintly visible under a hand lens, but are very thin and patchy; lower boundary is gradual and smooth.
B3ca2 2567	18 to 25 inches. White (10YR 8/2 dry) to light yellowish brown (10YR 6/3.5 moist) silt loam; hard (dry), friable (moist); weak coarse subangular blocky structure; calcareous;the horizon contains moderate amounts of accumulated lime both as lime flour and as mycelia; lower boundary gradual and smooth.
Cca1 2568	25 to 33 inches. Very pale brown (10YR 8/3 dry) to pale brown (10YR 6/3 moist) silt loam; hard (dry), friable (moist); massive; calcareous; the horizons contain much accumulated lime chiefly as lime flour; lower boundary is gradual and smooth.
Cca2 2569	33 to 43 inches. Very pale brown (10YR 8/3 dry) to pale brown (10YR 6/3 moist) silt loam; slightly hard (dry), very friable (moist); massive; calcareous; the horizon contains moderate amounts of accumulated calcium carbonate chiefly as lime flour.

SOIL SURVEY LABORATORY Lincoln, Nebr. January, 1960

SOIL TYPE * Weldona sandy loam **LOCATION** Morgan County, Colorado

SOIL NOS. S59Colo-44-5 **LAB. NOS.** 10858-10863

DEPTH INCHES	HORIZON	PARTICLE-SIZE DISTRIBUTION (in mm.) (per cent) 1B1a: VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	3A1 2A2 > 2 (<19mm)	TEXTURAL CLASS
0-6	Ap	7.3	13.8	11.8	16.4	12.1	28.7	9.9	37.7	10.5	Tr.	sl
6-15	B2t	14.8	20.7	11.8	14.6	6.2	12.3	19.6	19.0	6.1	Tr.	cosl/scl
15-21	B3	17.7	25.5	15.1	17.1	4.3	7.7	12.6	13.7	5.2	Tr.	cosl
21-31	C1	6.0	24.5	20.5	23.4	6.0	8.0	11.6	18.3	5.1	Tr.	cosl
31-45	C2	6.2	22.4	23.5	26.6	6.1	6.6	8.6	19.3	4.1	Tr.	lcos
45-62	C3	14.0	26.9	17.8	20.9	5.3	6.3	8.8	16.0	4.1	6	lcos

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM	6E1a $CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.2			0.55	0.052	10			<1				4.3
6.9			0.38	0.043	9			<1				7.6
7.2			0.22	0.028				<1				4.7
7.6			0.14	0.014				<1				4.5
8.5			0.05					<1				3.2
8.5			0.03					<1				3.2

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	BASE SAT. % NH_4Ac EXCH.	Base Sat. % on Sum Cations	Sum Ext. Bases	Sum Ext. Cations	Ca/Mg	O. D. Bulk Density	MOISTURE AT SATURATION
← milliequivalents per 100g. soil →											g/cc	%
						5C1	5C3	5B1a	5A3a	8D3		
7.1	4.7	1.4	1.4	<0.1	1.3	104	84	7.4	8.8	3.4		
12.7	10.1	3.2	1.7	<0.1	0.5	109	89	13.8	15.5	3.2		
9.2	7.5	2.5	1.0	<0.1	0.2	111	91	10.2	11.2	3.0		
9.2	7.6	2.6	0.7	<0.1	0.2	113	94	10.4	11.1	2.9		
7.0	9.8	2.2	<0.1	<0.1	0.2	174	100	12.2	12.2	4.4		
6.7	8.6	2.1	<0.1	0.1	0.2	164	100	11.0	11.0	4.1		

Soil Type: *Weldona sandy loam
Soil Nos.: S59Colo-44-5
Field classification: Chestnut.
Location: 250 feet east, 1,050 feet north of southwest corner, Sec. 31, T3N, R59W, Morgan County, Colorado. Photo: YE-7F-10.
Climate: Continental, average annual precipitation 15-17 inches; frost-free season 146 days, mean annual temperature 48° F. Elevation 4,630 feet.
Vegetation: Dry cropland fallow.
Parent material: Arkosic alluvium.
Physiographic position: Terrace.
Relief: Nearly level 0-1 percent slope.
Drainage: Slow external, medium internal.
Moisture: Moist to 56 inches at time of sampling.
Water table: None or very deep.
Stoniness: Few small gravels.
Salt or alkali: None observed.
Erosion: Slight to moderate wind, estimate 2 to 3 inches surface horizon lost. Has been under cultivation 12 to 15 years, 2 years idle because of drought.
Described by: Clayton F. Spears, May 5, 1959.
Remarks: Numerous small krotovinas in B2, B3, and C1 horizons. Two dark brown charcoal strips about 1/4 inch thick at 33 inches and 42 inches which ran in smooth continuous lines across pit areas.

Horizon and Lincoln Lab. No.	
Ap 10858	0 to 6 inches. Grayish brown (10YR 5.5/2 dry) to dark brown (10YR 3/3 moist) very dark grayish brown (10YR 3/2 crushed) sandy loam; weak fine granular structure; slightly hard when dry, friable moist; noncalcareous; the 5- to 6-inch layer shows some weak fine platy structure probably due to tillage; lower boundary clear and smooth.
B2t 10859	6 to 15 inches. Brown (8.75YR 5/3 dry) to dark brown (7.5YR 3/2 moist) brown (7.5YR 4/3 crushed) sandy clay loam; moderate medium prismatic structure breaking to moderate medium subangular blocks; hard to very hard dry, friable when moist; moderate nearly continuous clay skins on vertical and horizontal faces of soil aggregates; noncalcareous; lower boundary clear and smooth.
B3 10860	15 to 21 inches. Light olive brown (1.25Y 5/4 dry) to olive brown (1.25Y 4/3 moist and crushed) coarse sandy loam; weak coarse subangular blocky structure; hard when dry, friable moist; very thin patchy clay skins on vertical faces of soil aggregates; noncalcareous; lower boundary clear and wavy.
C1 10861	21 to 31 inches. Light olive brown (2.5Y 5.5/4 dry) to olive brown (2.5Y 4.5/3 moist and crushed) loamy coarse sand; massive; slightly hard when dry, friable moist; noncalcareous; lower boundary clear and wavy.
C2 10862	31 to 45 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist and crushed) coarse sand; massive; noncalcareous; very dark brown (10YR 2/2) charcoal strips approximately 1/4 inch thick at 33 inches and 42 inches in this horizon. Lower boundary gradual and smooth.
C3 10863	45 to 62 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist and crushed) sand, massive; noncalcareous; lower boundary clear and smooth.
C4	62 to 70 inches. Light yellowish brown (2.5Y 6/4 dry) to light olive brown (2.5Y 5/4 moist) sandy clay loam; massive; hard dry, friable moist; noncalcareous; lower boundary clear and smooth.
C5	70 to 108 inches. Pale yellow to light yellowish brown (2.5Y 6.5/3 dry) to light olive brown (2.5Y 5/3 moist) coarse sand and sand stratified; massive, soft dry, friable moist; noncalcareous.

Bureau of Public Roads samples:

Ap	0-6 inches
B2t	6-15 inches
C2	31-45 inches

ADDITIONAL NOTES: There are a few thin seams of clayey material and a few small clay balls in the C3 and C4 horizons.

SOIL SURVEY LABORATORY Lincoln, Nebr. January, 1960

SOIL TYPE * Weldona sandy loam **LOCATION** Morgan County, Colorado

SOIL NOS. S59Colo-44-6 **LAB. NOS.** 10864-10871

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm.)	TEXTURAL CLASS
0-8	Ap	7.5	9.1	6.2	12.6	15.4	36.0	13.2	44.9	13.0	Tr.	l
8-12	B21t	9.2	11.5	7.6	13.8	11.5	28.0	18.4	37.1	9.1	2	fsl
12-18	B22t	10.2	12.2	7.6	12.6	10.1	23.0	24.3	30.8	8.1	Tr.	scl
18-25	B3	19.2	27.3	13.3	16.4	6.2	7.4	10.2	17.5	3.3	10	lcos
25-31	C1	8.0	14.7	14.6	28.8	12.0	10.4	11.5	32.1	4.6	Tr.	sl
31-35	C2	15.5	24.3	15.7	19.0	7.0	8.0	10.5	19.9	3.5	Tr.	lcos
35-40	C3	9.9	30.0	18.0	19.5	5.9	7.2	9.5	18.2	2.9	Tr.	lcos
40-57	C4	13.4	22.6	15.3	21.4	8.7	9.6	9.0	23.4	4.6	6	lcos

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6H1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM	6E1a $CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.1			0.54	0.058	9			Δ				5.5
7.3			0.43	0.051	8			Δ				8.2
7.5			0.41	0.053	8			Δ				10.5
7.8			0.14	0.018				Δ				3.9
7.8			0.20					Δ				4.8
8.2			0.13					Δ				3.9
8.4			0.08					1				3.4
8.5			0.05					1				2.6

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	6H1a H	6P2a Na	5B1a 6Q2a K	BASE SAT. % NH_4Ac EXCH. 5C1	Base Sat. % on Sum Cations 5C3	Sum Ext. Bases 5B1a	Sum Ext. Cations 5A3a	Ca/Mg 8D3	O. D. Bulk Density g/cc	MOISTURE AT SATURATION %
←	milliequivalents per 100g. soil →											
8.9	6.9	1.8	1.9	0.1	0.7	107	83	9.5	11.4	3.8		
11.9	9.8	2.8	1.7	0.5	0.6	115	89	13.7	15.4	3.5		
16.3	12.7	4.0	1.5	0.8	0.6	111	92	18.1	19.6	3.2		
8.1	6.1	2.2	0.2	0.4	0.2	110	98	8.9	9.1	2.8		
10.2	8.1	2.3	0.7	0.5	0.3	110	94	11.2	11.9	3.5		
9.0		2.5	1.9	0.4	0.2							
7.8		2.7	<0.1	0.3	0.2							
7.0				0.2	0.2							

Soil Type: *Weldona sandy loam
Soil Nos.: S59Colo-44-6
Field Classification: Chestnut.
Location: 75 feet east, 170 feet south of the north quarter corner, Sec. 23, T1N, R6OW, Morgan County, Colorado. Photo: YE-5F-38.
Climate: Continental, average annual precipitation 15-17 inches, frost-free season 146 days, mean annual temperature 48° F, elevation 4,730 feet.
Vegetation: Dry cropland fallow.
Parent material: Arkosic alluvium.
Physiographic position: Terrace.
Relief: Nearly level 0-1 percent slope.
Drainage: Slow external, moderate or medium internal.
Moisture: Moist to 56 inches at time of sampling.
Water table. None or very deep.
Stoniness: Few small water-worn gravels throughout profile.
Erosion: Slight to moderate wind.
Described by: Clayton F. Spears, May 6, 1959.
Remarks: Has been under cultivation less than 10 years. Numerous small krotovinas in B2, B3 horizons.

Horizon and Lincoln Lab. No.	
Ap 10864	0 to 8 inches. Grayish brown to brown (10YR 5/2.5 dry) to dark brown (10YR 3/3 moist and crushed) sandy loam; weak fine crumb structure; soft when dry, very friable moist; noncalcareous; lower boundary clear and smooth.
B21t 10865	8 to 12 inches. Brown (10YR 5/3 dry) to dark brown (8.75YR 3/3 moist) (10YR 3/3 crushed) sandy clay loam; moderate medium prismatic structure breaking to moderate medium subangular blocks; hard when dry, friable when moist; moderate nearly continuous clay skins on both vertical and horizontal faces of soil aggregates; noncalcareous; lower boundary clear and wavy.
B22t 10866	12 to 18 inches. Dark grayish brown (10YR 4/2 dry) to very dark grayish brown (10YR 3/2 moist) (10YR 3.5/2 crushed) sandy clay loam; moderate medium prismatic structure breaking to moderate medium subangular blocks; hard to very hard when dry, friable moist; moderate continuous clay skins on both vertical and horizontal faces of soil aggregates; noncalcareous; lower boundary clear and wavy.
B3 10867	18 to 25 inches. Light yellowish brown (1.25Y 6/3 dry) to olive brown (1.25Y 4/3 moist and crushed) coarse loamy sand; weak coarse subangular blocky structure; hard when dry, friable when moist; very thin patchy clay skins on vertical faces of soil aggregates and in root channels; noncalcareous; lower boundary clear and smooth.
C1 10868	25 to 31 inches. Light yellowish brown (1.25Y 6/3 dry) to light olive brown (1.25Y 5/3 moist) sandy loam; massive; slightly hard dry, friable moist; noncalcareous; lower boundary clear and smooth.
C2 10869	31 to 35 inches.
C21	31 to 32½ inches. Light yellowish brown (1.25Y 6/3 dry) to light olive brown (1.25Y 5.5/3 moist) coarse sand, massive; strongly calcareous.
C22	32 to 33½ inches. Grayish brown (2.5Y 5/2 dry) to dark grayish brown (2.5Y 4/2 moist) sandy clay loam; massive; slightly hard dry, friable moist; this horizon contains a charcoal strip 1/4 inch wide which is very dark brown (10YR 2/2 moist); strongly calcareous.
C23	33½ to 35 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) loamy coarse sand; massive; slightly hard dry, very friable moist; slightly calcareous; lower boundary clear and wavy.
C3 10870	35 to 40 inches. Pale yellow (2.5Y 6.5/3 dry) to light olive brown (2.5Y 5.5/3 moist) loamy sand; massive, slightly hard dry, friable moist; this horizon is calcareous with calcium carbonate occurring in the form of thin seams and small soft concretions but at least 50 percent of material in this horizon is noncalcareous. It is not a horizon of lime accumulation; lower boundary clear and smooth.
C4 10871	40 to 57 inches. Pale yellow (2.5Y 6.5/3 dry) to light olive brown (2.5Y 5.5/3 moist) coarse sand; massive, soft dry, friable moist; very slightly calcareous in places, but no visible seams or concretions of calcium carbonate can be noted; lower boundary clear and smooth.
C5	57 to 61 inches. Light brownish gray (10YR 6.5/2 dry) to grayish brown (10YR 4.5/2 moist) sandy loam; massive; soft dry, friable moist; very slightly calcareous in spots; lower boundary gradual and smooth.
C6	61 to 83 inches. Pale yellow to light yellowish-brown (2.5Y 6.5/3 dry) to light olive brown (2.5Y 5.5/3 moist) coarse sand; massive; dry soft, moist friable; noncalcareous; lower boundary clear and smooth.
C7	83 to 90 inches. Pale yellow to light yellowish brown (2.5Y 6.5/3 dry) to light olive brown (2.5Y 5/3 moist) stratified loamy sand, sand, and sandy loam; massive: soft dry, friable moist; few medium distinct mottles of bright yellowish brown (10YR 5/6 5/8 moist or dry); noncalcareous; lower boundary gradual and smooth.
C8	90 to 108 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) loamy coarse sand, massive; noncalcareous; few medium mottles of bright yellowish brown (10YR 5/6 5/8 moist or dry).

Bureau of Public Roads Samples: Ap 0-8 inches; B22t 12-18 inches; C4 40-57 inches.
ADDITIONAL NOTES: Both the C3 (35-40 inches) and the C4 (40-57 inches) horizons contained a few thin seams of olive clayey material and a few small clay balls.

SOIL SURVEY LABORATORY Lincoln, Nebr. May, 1959

SOIL TYPE Wiley silt loam **LOCATION** Prowers County, Colorado

SOIL NOS. S58Colo-50-8 **LAB. NOS.** 9706-9711

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-4	Ap	<0.1	0.2	0.3	1.5	19.9	55.5	22.6	60.8	15.7	-	sil
4-10	B21t	0.1	0.1	0.2a	1.1a	14.4a	57.5	26.6	53.5	19.3	-	sil/sicl
10-17	B22t	0.1	0.1	0.1a	0.8a	9.7a	62.2	27.0	51.0	21.5	-	sicl/sil
17-29	B3ca	<0.1	0.1	0.1a	0.5a	8.4a	65.8	25.1	50.0	24.6	-	sil
29-41	C1	<0.1	0.1	0.1a	0.6a	9.8a	66.1	23.3	52.0	24.4	-	sil
41-60	C2	<0.1	0.1	0.1a	0.8a	10.9a	67.3	20.8	54.5	24.3	-	sil

pH 8C1a 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 6A1a	6E1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.8			0.98	0.108	9	<0.20	0.7	2				10.1
7.9			0.78	0.088	9	<0.20	0.6	7				11.6
7.9			0.52	0.062	8	<0.20	0.7	9				11.5
8.2			0.33	0.040	8	<0.20	1.0	9				10.9
8.6			0.22			<0.20	0.9	8				11.3
8.5			0.18			<0.20	2.2	6	<1			10.8

5A1a CATION EXCHANGE CAPACITY NH_4Ac	EXTRACTABLE CATIONS Ca	Mg	H	6P2a Na	5B1a 6Q2a K	5D2 EXCH. Na %	8A1 SATURATION EXTRACT SOLUBLE 6F1a Na	6Q1a K			8A MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← milliequivalents per liter →				
18.7				<0.1	1.4	<1	0.4	0.7			53.2
18.7				0.1	0.8	<1	0.5	0.3			58.9
18.6				0.3	0.7	1	1.4	0.3			58.3
18.8				1.6	0.7	7	5.4	0.2			58.0
18.7				3.1	0.7	14	6.8	0.1			55.9
19.2				4.5	0.6	19	16.6	0.1			54.1

a. Trace $CaCO_3$ concr.

Soil Type: Wiley silt loam
Soil Nos.: S58Colo-50-8
Classification: Sierozem.
Location: 800 feet east, 700 feet south of northwest corner, Sec, 8, T24S, R45W, Prowers County, Colorado.
Climate: Continental climate, average annual precipitation 13 to 14 inches, elevation 3,840 feet. Frost-free season 166 days.
Vegetation: Sorghum.
Parent Material: Loess.
Physiographic Position: Upland.
Stoniness: None.
Water Table: None encountered.
Salt or Alkali: None observed.
Relief: Gently sloping, 2 to 3 percent slope.
Drainage: Well.
Moisture: Dry.
Erosion: Slight to moderate, principally wind.
Described by: E. Milton Payne, November 6, 1958.

Horizon and Lincoln Lab. No.

Ap 9706 — 0 to 4 inches. Grayish brown (10YR 5.5/2 dry) to dark grayish brown (10YR 3.5/2 moist) silt loam; weak coarse platy breaking to weak fine granular; hard when dry, friable when moist; slightly effervescent; clear smooth boundary.

B21t 9707 — 4 to 10 inches. Grayish brown (10YR 5.5/2 dry) to dark grayish brown (10YR 4/2 moist) silty clay loam; weak coarse prismatic breaking to moderate medium subangular blocky structure; hard when dry, friable when moist; thin patchy clay skins; strongly effervescent; gradual smooth boundary.

B22t 9708 — 10 to 17 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4.5/2.5 moist) silty clay loam; weak medium prismatic breaking to moderate medium subangular blocky structure; hard when dry to firm when moist; very thin nearly continuous clay skins; violently effervescent with a few scattered lime spots; gradual smooth boundary.

B3ca 9709 — 17 to 29 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4.5/3 moist) silty clay loam; weak medium prismatic breaking to weak medium to coarse subangular blocky structure; hard when dry, firm when moist; thin patchy clay skins; violently effervescent with numerous lime spots; clear smooth boundary.

C1 9710 — 29 to 41 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) light silty clay loam; weak coarse subangular blocky structure; hard when dry, friable when moist; violently effervescent; gradual smooth boundary.

C2 9711 — 41 to 60 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) silt loam; very weak coarse subangular blocky structure; slightly hard when dry, very friable when moist; violently effervescent; gradual smooth boundary.

C3 — 60 to 90 inches. Very pale brown (10YR 7/3.5 dry) to yellowish brown (10YR 5/3.5 moist) silt loam; massive; slightly hard when dry, very friable when moist; violently effervescent.

D1 — 90 to 105 inches. Light brown (7.5YR 6.5/4 dry) to brown (7.5YR 5/4 moist) silt loam; massive; slightly hard when dry, very friable when moist; violently effervescent.

D2 — 105 inches plus. Pink (7.5YR 7/5 dry) to brown (7.5YR 5/5 moist) light silty clay loam; massive; slightly hard when dry, very friable when moist; violently effervescent with some salt and lime spots.

Bureau of Public Roads Samples:

Ap	0 to 4 inches
B22	10 to 17 inches
C2	41 to 60 inches.

SOIL SURVEY LABORATORY Lincoln, Nebr. May, 1959

SOIL TYPE Wiley silt loam LOCATION Prowers County, Colorado

SOIL NOS. S58Colo-50-9 LAB. NOS. 9712-9717

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)							3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			

Soil Type: **Wiley** silt loam
Classification: Sierozem
Location: 50 ft. E, 600 ft. N of center of Sec. 17, T24S, R45W, Prowers County, Colorado.
Date Sampled: November 6, 1958
Climate: Continental climate, average annual precipitation 13 - 14 inches, elevation 3,860 feet. Frost free season 166 days.
Vegetation: Fallow. Parent Material: Loess. Physiographic position: Upland.
Relief: Gently sloping, 2% north facing slope. Drainage: **Well**
Moisture: Slightly moist. Watertable: None **encountered. Stoniness: None.**
Salt or alkali: None observed. Erosion: Moderate, primarily wind.
Soil Nos. S-58-Colo-50-9
Described by: E. Milton Payne.

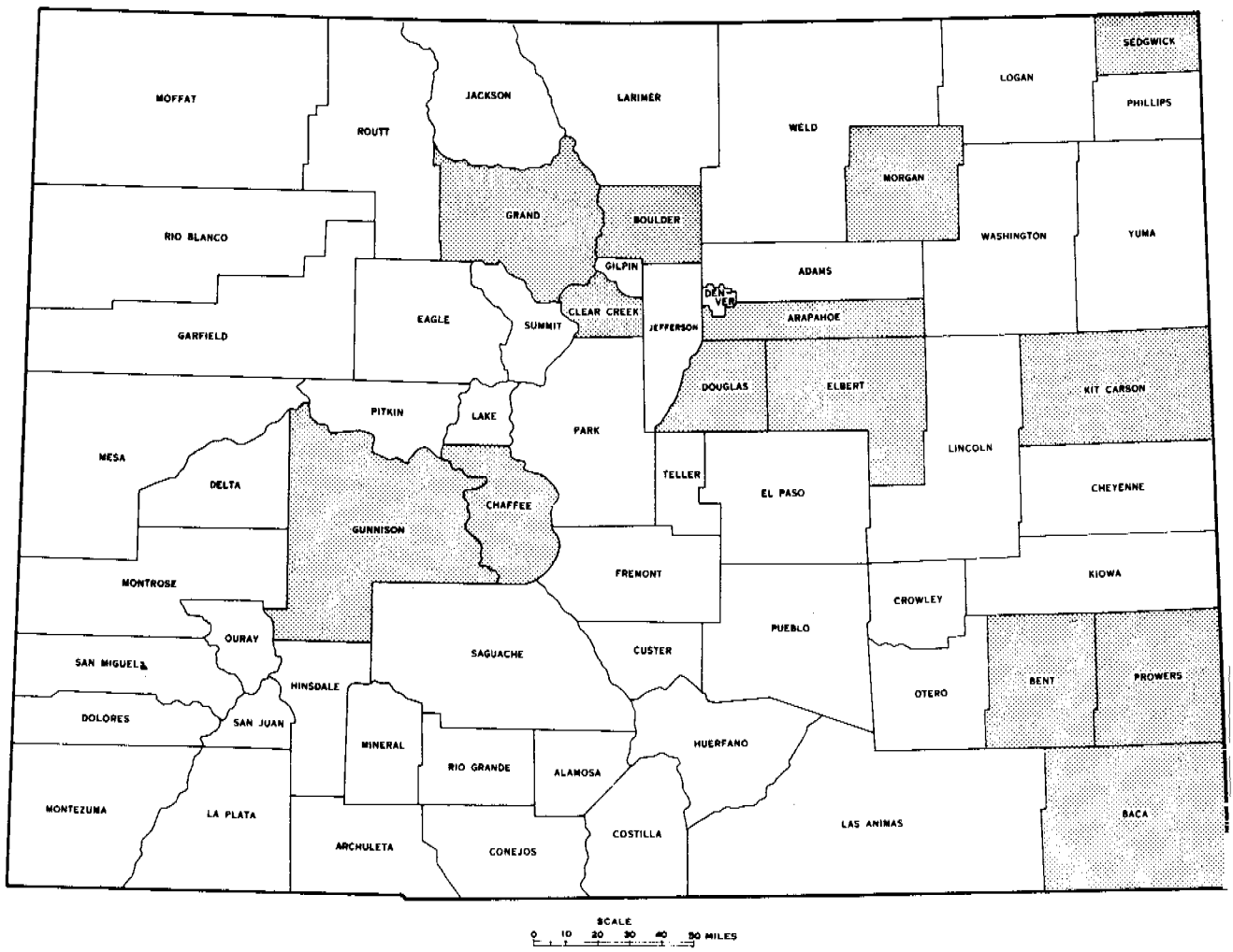
Lincoln Lab. No.	Horizon		
9712	Ap	0-5 inches	Grayish brown (10YR 5.5/2 dry) to dark grayish brown (10YR 3.5/2 moist) silt loam; weak coarse platy structure breaking to weak medium granular; slightly hard dry, friable moist; strongly calcareous; clear smooth boundary.
9713	B_{21t}	5-13 inches	Light grayish brown (10YR 6.5/2 dry) to dark grayish brown (10YR 4.5/2 moist) silty clay loam; weak coarse prismatic breaking to weak medium subangular blocky structure; hard when dry, friable moist; thin nearly continuous clay skins, strongly calcareous; gradual wavy boundary.
9714	B_{22t}	13-23 inches	Light grayish brown (10YR 6.5/2 dry) to grayish brown (10YR 5/2.5 moist) silty clay loam; weak coarse prismatic structure; breaking to weak medium subangular blocky; thin patchy clay skins; violently calcareous with a few scattered lime spots; gradual wavy boundary.
9715	B_{3ca}	23-33 inches	Pale brown (10YR 6.5/3 dry) to brown (10YR 5/3 moist) silty clay loam; very weak coarse subangular blocky structure; hard when dry, friable moist; clay skins found in worm and root channels; violently calcareous with very few lime spots; clear smooth boundary.
9716	C_1	33-43 inches	Pale brown (10YR 6.5/3 dry) to brown (10YR 5/3 moist) light silty clay loam; very weak coarse subangular blocky structure; slightly hard when dry, friable moist; violently calcareous; clear smooth boundary.
9717	C_2	43-61 inches	Very pale brown (10YR 7/2.5 dry) to brown (10YR 5/3 moist) silt loam; massive; slightly hard when dry, very friable moist; violently calcareous; gradual smooth boundary.
	C_3	61-97 inches	Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) silt loam; massive; slightly hard when dry, very friable moist; violently calcareous.
	D	97-116 inches	Very pale brown to pink (8YR 7/4 dry) to yellowish brown (8YR 5/4 moist) light silty clay loam; massive; slightly hard when dry, friable moist; violently calcareous.

Bureau of Public Roads Samples

Ap 0-5 inches; B_{21} 5-13 inches; C_2 43-61 inches.

* U. S. GOVERNMENT PRINTING OFFICE : 1967 O - 264-928

COLORADO


MOFFAT
ROUTT
JACKSON
LARIMER
WELD
LOGAN
SEDGWICK
PHILLIPS
MORGAN
RIO BLANCO
GRAND
BOULDER
WASHINGTON
YUMA
GILPIN
ADAMS
DEN-VER
GARFIELD
EAGLE
SUMMIT
CLEAR CREEK
JEFFERSON
ARAPAHOE
DOUGLAS
ELBERT
KIT CARSON
PITKIN
LAKE
PARK
MESA
DELTA
TELLER
EL PASO
LINCOLN
CHEYENNE
GUNNISON
CHAFFEE
FREMONT
KIOWA
MONTROSE
CROWLEY
OURAY
SAGUACHE
CUSTER
PUEBLO
SAN MIGUEL
HINSDALE
OTERO
BENT
PROWERS
DOLORES
SAN JUAN
MINERAL
RIO GRANDE
ALAMOSA
HUERFANO
MONTEZUMA
LA PLATA
ARCHULETA
CONEJOS
COSTILLA
LAS ANIMAS
BACA
SCALE
0 10 20 30 40 50 MILES